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Сборник содержит материалы научных работ Международной молодежной научно-практической конференции на иностранных языках «Люди. Наука. Инновации в новом тысячелетии» (Москва, 23–25 ноября 2015 г.). В работе конференции, организованной при поддержке РФФИ, принимали участие ученые, докторанты, аспиранты, магистранты и студенты российских и зарубежных вузов, сотрудники научно-исследовательских учреждений и производственных предприятий.

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PEOPLE. SCIENCE. INNOVATIONS IN THE NEW MILLENNIUM

HUMAN ECOLOGY

***Antropova N.S.*[1], *Rogozhin V.N.*[2]**

OBTAINING SINGLE DOMAIN NANOBODIES SPECIFIC FOR HUMAN INTERFERON-β AND THEIR USE IN AFFINITY PURIFICATION

Russia

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Abstract: Blood of camelids contains both conventional heterotetrameric antibodies and unique functional heavy-chain antibodies. Single-domain antigen-binding fragments of these heavy-chain antibodies, known as VHH or mini-antibodies (nanobodies) began to be used in basic research. In this review attention is paid to obtaining nanobodies specific for human interferon-β in order to obtain a preparation with high biological activity for application in mass production.

Key words: interferon-β, affinity purification, antibody, single domain, nanobodies, alpaca, recombinant bacteriophage, E.coli

Useful properties of interferon such as antiviral, antitumor activity, as well as participation in the regulation of immune processes are the basis for the widespread use of interferons as

therapeutic drugs. Currently, recombinant interferon-β is used to treat a number of diseases, including multiple sclerosis. Creation of a producing strain of human interferon-β allowed to receive a biologically active protein in sufficient quantities for use in medical practice. However, currently known methods of producing recombinant interferon-β are laborious, expensive and described for analytical quantities of protein [1]. All these methods use standard protein schemes which comprise dissolving in the buffer containing chaotropic agents or ionic detergents in rather high concentrations, which seriously complicate the protein purification at subsequent stages. One of the most effective ways of purifying IFN-β is realized by affinity chromatography using monoclonal antibodies specific to interferon. However, monoclonal antibodies are not stable enough and have a small storage time, it makes the product more expensive. Moreover, the use of this method of treatment is limited by the fact that ethylene glycol used for washing the column from unrelated substances is highly toxic to the body [2].

In 1990 the antibodies different from previously known classical antibodies were found in the blood of representatives of the family of camelids (Camelus dromedarius, Camelus bactrianus, Lama glamaand, Lama guanicoe) and some cartilaginous fish (Ginglymostoma cirratum, Hydrolagus colliei). They are unique as they are devoid of light chains and do not have the first constant domain (CH1). Single-domain antigen-binding fragments, known as VHH or mini-antibodies (nanobodies) began to be used in basic research [3].

One of the methods of obtaining them is the selection of the variable domains from combinatorial libraries of phage mini-antibodies (phage display). Each bacteriophage in a library exhibits only one antibody of unique specificity (phage antibody) on its surface [4]. During the affinity selection procedure one can greatly enrich the initial library with bacteriophages carrying nanobodies of desired specificity on their surface, and then one can select mini-antibodies with the desired properties from the

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enriched population. Nanobodies are widely used for diagnosis of various diseases. With smaller dimensions than those of classical antibodies it is easier for nanobodies to penetrate the tissue, overcome the blood-brain barrier to cause less nonspecific immune response. Multifunctional nanobodies, means of targeted drug delivery to the body of the patient, are designed on the basis of nanobodies [6].

Thanks to such properties as high affinity, stability, ease of use in large quantities and long-term storage, nanobodies began to be used in basic research, diagnostics, therapy, medicine and biotechnology. The use of nanobodies for purification of recombinant human interferon-β by affinity chromatography is the subject of research, since the use of a highly selective interaction of nanobodies with an antigen allows to achieve a very high degree of purification of the desired substance in a single step [7].

The aim of this work was to obtain single-domain nanobodies most effectively binding to human interferon-β for their further use in affinity chromatography.

To accomplish this goal it was necessary to obtain recombinant phaghes exposing single domain antibodies on their surface, then to receive producing bacterium E. coli expressing single-domain antibodies specific for IFN-β, and to determine conditions for their production, isolation and purification.

The blood sampling was produced from immunized alpacas. After a series of procedures the library of phagemid vectors (phagemids) carrying genes of single-domain nanobodies was generated. Then they were worked out in the form of bacteriophages displaying molecules of single-domain nanobodies on their surface. For producing bacterial E. coli, E. coli cells were infected with selected clones of bacteriophages. Afterwards the selection of cell components and purification of nanobodies from the periplasmic fraction of E. coli cells were carried out. The ability of nanobodies to specifically bind to IFN-β was confirmed by ELISA and Western blotting.

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Thus nanobodies having high specificity to human IFN β were obtained. The conditions of their expression and purification were also worked out. From the data obtained it can be assumed that single domain antibodies have the requisite properties for their use in affinity chromatography as ligands, with it being the next step in the study. Further modification of nanobodies for a more effective binding, for example, the trimerization of nanobodies, will allow to receive a preparation of nanobodies with higher biological activity for its use in affinity chromatography for mass production of human IFN-β. This will reduce the deficit of the therapeutic drug and its high price.

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ВОЗРАСТНЫЕ И ГЕНДЕРНЫЕ ОСОБЕННОСТИ НАСЕЛЕНИЯ, СТРАДАЮЩЕГО ОТ СТИХИЙНЫХ БЕДСТВИЙ В РЕСПУБЛИКЕ БАНГЛАДЕШ

Бангладеш, Россия
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Аннотация. Одной из наиболее серьезных проблем для Республики Бангладеш (РБ) являются стихийные бедствия, с которыми страна сталкивается ежегодно. Причинами наводнений, циклонов, торнадо, приливных волн и т.п. являются, прежде всего, географические особенности расположения РБ: бо́льшая часть территории страны - это низменность на аллювиальных равнинах с высотами менее 10 м выше уровня моря в пределах общей дельты крупных рек Ганга, Брахмапутры и Мегхны (Джамуна), которая практически ежегодно затапливается [1]; относительно возвышенная территория - Читтагонгские холмы (высочайшая точка страны - г. Модок-Муал, 1003 м) - занимает менее одной десятой части площади страны; вдоль восточной и северной границы с Индией лежат невысокие холмы Мадхпур, высота которых не превышает 30 м; на юго-западе страны находятся обширные мангровые болота Сундарбан, а юг страны омывается Бенгальским заливом Индийского океана.

Наиболее уязвимыми слоями населения, на которых тяжелее всего сказываются последствия стихийных бедствий, являются женщины, пожилые люди и дети [2].

Наше исследование проводилось с 2012 по 2015 гг., в течение которых мы изучали динамику стихийных бедствий за

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период с 2000 по 2014 гг. и выявляли причины возникновения и распространения кишечных инфекций среди населения РБ.

Для анализа мы использовали сведения, предоставленные Аварийной базой данных о бедствиях (EM-DAT), Международным банком данных по бедствиям www.emdat.be Католического университета Louvain (Брюссель-Бельгия) и Всемирным банком данных МБРР МАР.

Ключевые слова: Республика Бангладеш, стихийные бедствия, пол, географический объект, население, наводнения

***Alam M. SH.*[1], *Rodionova O.M.*[2]**

AGE AND GENDER CHARACTERISTICS OF THE POPULATION AFFECTED BY NATURAL DISASTERS IN BANGLADESH

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Abstract. Natural disaster is a common fact in Bangladesh. More or less every year Bangladesh faces different kinds of natural disasters like flood, cyclones, tornadoes, tidal surges, droughts and huge level of river erosion etc. Most of the country is occupied by alluvial lowland plains with elevations less than 10 m above the sea level within the overall delta of the Ganges, the Brahmaputra and the Meghna (Jamuna), which is flooded almost every year. [1] A relatively elevated area is the Chittagong hills (the highest point of the country is the Modoc-Mual Mountain, 1003 m), which is less than one tenth of the land area. The eastern and northern borders with India are low hills of Madhpur which height does not exceed 30 meters. In the south-west of the country, vast mangrove swamps of the Sundarbans are situated. Due to this climate system, Bangladesh is the worst victimized country of natural disasters which causes loss of lives and properties. [2] Disaster impacts men and woman differently. It magnifies the socially construct inequalities between men and women where women

are always the worst victims for their gender differentiated roles and lack of access and control over resources. The study tried to explore the natural disaster situation during the period of 2000-2014 and the more adverse effect of natural disasters on women than on men. It also focuses on children, elders, disabled and women who are more vulnerable to climate change induced disasters. We used the Emergency Disasters Data Base (EM-DAT), Universite Catholique de Louvain, Brussels-Belgium for observation of the natural disaster conditions and The World Bank, IBRD-IDA data for population structure.

Key words: People's Republic of Bangladesh, natural disasters, gender, geographical feature, population, flood

Введение

Стихийные бедствия наносят значительный ущерб инфраструктурам стран, вызывают внутреннюю миграцию населения и становятся причинами большого количества смертей. С 1990 по 1998 гг. 97% всех смертельных исходов, связанных со стихийными бедствиями (90% в результате наводнений, засух и штормов), приходились на развивающиеся страны [3, 4], в которых антропогенная деградация окружающей среды приводит к более явным и долгосрочным изменениям климата и экстремальным погодным условиям. Изменения климата приводят к снижению сельскохозяйственного производства во многих тропических и субтропических районах, население которых уже сталкивается с нехваткой продовольствия и чистой питьевой воды, что влечет за собой широкое распространение инфекционных кишечных заболеваний [5, 6]. В связи с глобальными изменениями климата для Республики Бангладеш (РБ) прогнозируется увеличение количества наводнений и снижение доступности питьевой воды для бедных слоев населения, 20% которого в настоящее время проживает в ежегодно затопляемой местности [7, 8]. Нагрузка на ВВП развивающихся стран в результате

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стихийных бедствий выше на 20%, чем в индустриально развитых странах [9].

Наиболее уязвимыми перед "лицом" стихийных бедствий являются женщины и дети, которые чаще гибнут во время и после катастроф. E. Neumayer и T. Plümper проанализировав последствия стихийных бедствий в 141 стране, обнаружили, что гендерные различия погибших тесно связаны с экономическими и социальными правами женщин. Например, при спасении предпочтения отдавались мальчикам и юношам, и в восстановительный период от нехватки продовольствия и экономических ресурсов чаще погибали девушки и женщины [10]. Другие исследования показали, что во время катастроф женщины погибают в 14 раз чаще, чем мужчины [11]. В 1991 году во время циклонов в РБ из 140 000 погибших 90% составили женщины [12, 18, 19]. Во время чрезвычайной ситуации, вызванной ураганом Катрина в Новом Орлеане (США) большинство погибших составили афро-американские женщины с детьми [13, 14]. Во время цунами в Шри Ланке в 2004 г. выжило больше лиц мужского пола, потому что именно мальчиков учат лазить по деревьям [15, 20, 21].

Часто, особенности питания в той или иной стране являются дополнительными причинами большей смертности женщин во время катастроф, т.к. многие культуры имеют пищевые иерархии с ущемлением прав женщин [16]. Так, в Южной и Юго-Восточной Азии 45-60% женщин репродуктивного возраста страдают от недостатка веса, а 80% беременных женщин имеют дефицит железа. В странах Африки, расположенных южнее Сахары, женщины поднимают и перемещают гораздо более тяжелые грузы, чем мужчины, но потребляют меньше калорий, т.к. согласно культурно-бытовым традициям этих стран, мужчины получают больше пищи [17].

Таким образом, основными причинами более высокой смертности женщин во время катастроф. являются: а) физические возможности женщин, в том числе, меньшие

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сила и выносливость, неумение лазить по деревьям и плавать; б) необходимость защиты других уязвимых членов семьи - детей и пожилых людей; в) меньшая информированность об угрозе стихийного бедствия, отсутствие средств и приспособлений для спасения, высокая скорость развития катастрофы.

Цель и задачи исследования

Изучение динамики стихийных бедствий в Республике Бангладеш за период с 2000 по 2014 гг. и выявление причин возникновения и распространения кишечных инфекций среди населения.

В данной статье мы представляем обзор следующих, рассмотренных в основной работе, задач:

- рассмотреть динамику стихийных бедствий и их социально-экономических последствий на различных континентах;
- определить наиболее разрушительные природные катастрофы для Республики Бангладеш;
- изучить гендерно-половой состав населения Республики Бангладеш за исследуемый период.

Результаты собственного исследования и их обсуждение

На рисунке 1 показаны экономические и социальные последствия стихийных бедствий для различных континентов. Видно, что по всем показателям наиболее пострадали страны Азии:

- количество стихийных бедствий в странах Азии составило 2431 из 6354 (%);
- погибло 743 тысячи человек из 1255 тыс. (%); пострадало 2714789 тысяч человек из 3106328 тыс. (%);
- был причинен экономический ущерб на сумму 903 млрд долл США (данные до 2014 г.) из 1968 млрд долл США.

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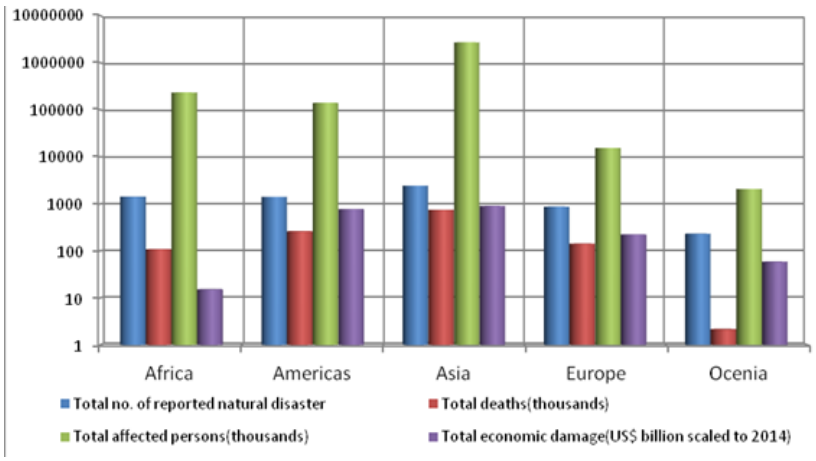

Рисунок 1. Влияние стихийных бедствий на экономику и население континентов. *Источник: EM-DAT: The ОФДА / КРЭД Международный банк данных по бедствиям www.emdat.be Католического университета Louvain (Брюссель-Бельгия)*

Одной из причин значительных масштабов ущерба является перенаселенность Азии, ярким примером такой страны служит Республика Бангладеш, которая является одной из наиболее густонаселенных стран в Мире, где плотность населения составляет 1015 чел/км^2 [22]. Это приводит к значительному антропогенному воздействию на окружающую среду из-за потребности выживания. В среднем, за период 1994-2013 гг. ежегодно из-за стихийных бедствий в РБ страдают 218 млн человек [23].

Рисунок 2 отражает ситуацию с пострадавшими и погибшими в РБ за период 2000-2012 гг. от различных стихийных бедствий. Видно, что максимальное количество населения страдает и погибает от наводнений и штормов, причиной чего, безусловно, является географическое расположение Бангладеш.

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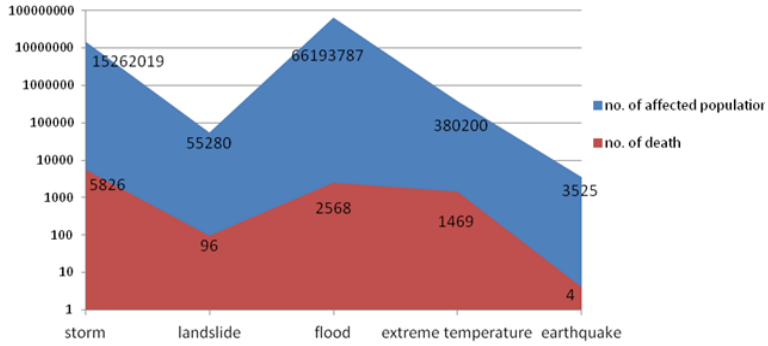

Рисунок 2. Общее количество пострадавшего населения и погибших в Республике Бангладеш от различных стихийных бедствий (2000-2012 гг.). *Источник: EM-DAT: The ОФДА / КРЭД Международный банк данных по бедствиям www.emdat.be Католического университета Louvain (Брюссель-Бельгия)*

На рисунке 3 видно, что распределение населения РБ по возрастным группам для мужчин и женщин в течение 15 лет было примерно одинаковым.

Если разделить все население РБ на две группы по критерию "активное/пассивное" население, становится ясным, что "активное", т.е. население в возрасте от 15 до 64 лет, составляет 63%, а на долю "пассивного", в возрасте от 0 до 14 и от 65 лет и старше, населения приходится 37%.

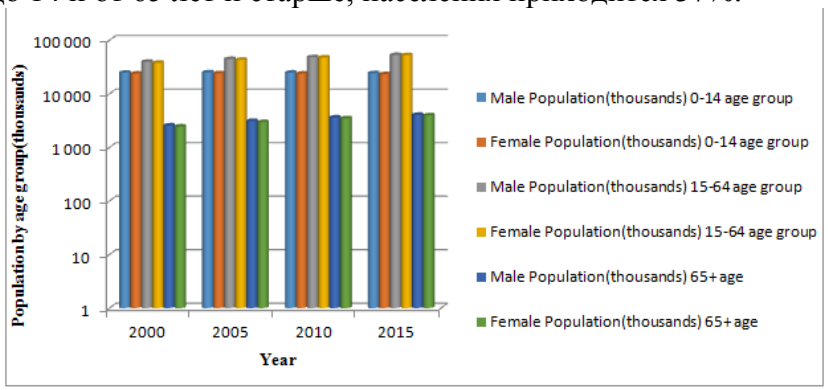

Рисунок 3. Распределение населения Республики Бангладеш по гендерно-возрастному составу. *Источник: Всемирный банк, IBRD.IDA*

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Именно этот контингент и является наиболее уязвимым в случае стихийного бедствия. Если же в эту группу отнести и женщин активного возраста (15-64 года), доля уязвимого населения возрастает до 68%.

Выводы

- при рассмотрении динамики стихийных бедствий и их социально-экономических последствий на различных континентах было выявлено, что по всем показателям более всего страдают страны Азии, что объясняется их перенаселенностью и низким уровнем жизни населения;
- наиболее разрушительными природными катастрофами для Республики Бангладеш являются наводнения и штормы, что объясняется географическими особенностями расположения страны;
- гендерно-половой состав населения Республики Бангладеш за исследуемый период, с точки зрения уязвимости во время стихийного бедствия, представляет собой следующее соотношение менее уязвимого (32%) и наиболее уязвимого (68%) населения. В последнюю категорию входят дети до 14 лет, женщины всех возрастов и пожилые люди старше 65 лет обоих полов.

Библиография

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ZOONOTIC INVASION IN URBANIZED AREAS

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Abstract: Environment is the main source of infections for humans. Annually, the accumulation of a lot of an invasive material occurs in it. As a rule, almost all of both wild and domestic animals are infested with helminthes. Toxocarosis is a dangerous disease. The invasion by *Toxocara* is eurycoenose among both animals and humans. *Toxocara* eggs are very stable to the impact of adverse factors of surroundings. They can be preserved in soil for a long time and are able to withstand action of diverse chemical agents. As for the eggs dissemination of *Toxocara* as well as of other helminthes, among other creatures, cockroaches and flies can act as a mechanical vector (according to some reports, also earthworms can). This investigation is dedicated to an experimental introduction of *Toxocara* larvae infection to earthworms *Eisenia Fetida*. There was conducted an infestation of the earthworms *Eisenia Fetida* via soil seeded by invasive eggs of *Toxocara*. Migration and expansion of the *Toxocara* larvae were found in tissues of earthworms.

Key words: *Toxocarosis, Toxocara spp, Eisenia Fetida*, earthworms, zoonoses, paratenism.

Introduction**.** According to the estimates of the World Health Organization, about 2 billion persons in the world are infested by soil-transmitted helminthes. Judging by the prevalence rate in the Russian Federation, the geohelminthosis is

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number two in toxocarosis [1-5]. Annually in the Russian Federation up to 5 thousand cases of the toxocarosis are detected. The risk of the contamination by the toxocarosis excitant increases in connection with the amplification of dogs and cats on a territory and a high level of their infestation by *Toxocara* [1-5,8,9,10].

After getting into a human body, eggs and larvae of some nematodes of animals can pass early developmental stages in it, though they are not able to finish their life cycle there. Toxocarosis belongs to diseases caused by larvae of nematode of animals. The toxocarosis is a parasitic disease caused by larvae migration into a human body, specifically by larvae of helminthes of dogs (*Toxocara canis*), less frequently of cats (*Toxocara mystax*) [4]. The toxocarosis features with a complex of syndromes and symptoms are denoted as visceral larva migrants. For humans, the toxocarosis is a zoonotic invasion. At a massive invasion by *Toxocara,* in the human immune system the development of severe injuries of respiratory organs, eyes, brain are possible [13,14]. An infestation of a human body takes place at deglutination of invasive eggs of *Toxocara*.

The main sources of the invasion for people are cats and dogs, which egest the eggs of *Toxocara cati* and *Toxocara canis* with excrements, which results in further environment contamination. But because of the *Toxocara* eggs great stability to destruction, in the nature, an invasive material accumulation takes place [2,3,5]. A larva development runs its course inside of an egg. This process takes 3 to 4 weeks at indoor temperature and much more time in colder conditions. As soon as the development in the egg results in the larva emersion, the egg becomes invasive one, while larvae stay in the eggs protected from adverse factors of their ambiance.

A direct contact with cats and dogs does not play a decisive role in the infestation as egested eggs of *Toxocara* are non-invasive and need further maturation in the ambience. The factor, which plays the basic role in the invasion transition to a human

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body, is a contact with the soil contaminated by infested dogs in rural localities via wild berries and mushrooms. The delivery of *Toxocara* eggs is possible with vegetables and greens. Among other possible factors of delivery, there are animals' hair, contaminated foodstuff, water and hands.

The infestation of a human body can occur in the natural way as a result of ingestion of parasite eggs. Also a possibility exists of the infestation via intake of a paratenic hosts for food (earthworms). Kids, who lick frequently their dirty hands and rub animals' hair get into a special risk group, Also it is true for those, who use invertebrates (earthworms) for food. A very high level of *Toxocara* eggs invasion is observed in parks and other public places. Sandpits for children can be practically completely infested by *Toxocara* eggs. Rodents, pigs, sheep, birds, earthworms can be paratenic (reservoir) hosts of the *Toxocara*. The further development of the excitant takes place in condition that the paratenic host is eaten by a cat or another final host. Also a human being acts as a paratenic host but he/she is not involved into the cycle of the invasion transition remaining a biological dead end for the parasite. There is not enough information on the earthworms as paratenic hosts, so the question remains a debatable one until now. Earlier, some investigations were devoted to detecting larvae *Toxocara spp*. in other non-typical (abnormal) hosts. Mainly, the experiments were limited to Toxocara larvae migration pattern at rodents and monodelphs; and there are only few reports about non-mammal vertebral hosts and hosts-invertebrates. In the world practice, the problem of the earthworms participation remains poorly studied. There exist only rather insignificant data on the experiments conducted with earthworms (*Eisenia Fetida, Pheretima posthuma*). This is what constitutes the actuality of the conducted studies [10,11,15].

Study purposes**:** To conduct an attempt of the experimental infestation of the earthworms by *Toxocara cati* and *Toxocara canis* larvae for a possibility of determination of the invasive larvae localization in earthworms *Eisenia fetida*. To estimate a

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period of larvae presence in the skin-muscular sac and intestines of earthworms.

Materials and methods. Helminthes (nematodes Toxocara cati, Toxocara canis) were obtained by the way of animals' dehelminthization. The obtained eggs suspension was placed into Petri dishes. 0.1 m of the H_2SO_4 solution was added. The suspension was left for cultivation in a thermostat at the temperature 28 ± 1^0C for 4 weeks. Starting from 13^{th} day in isolation, eggs with larvae started to be detected. Judging by the bio-trial results on rodents, on 21^{st} day of the incubation, larvae were already invasive.

The earthworms (species *Eisenia fetida*) were kept in glassy cylinders full of humus at indoor temperature. Before the experiment, in a random way, 10 earthworms were chosen and they were studied for detection of ascarid larvae acquired by them in natural conditions. 120 earthworms approximately equal in size were divided into two groups: 50 (group 1) and 10 (group 2 being a control one) *Toxocara cati* earthworms per each experimental session and the same numbers per a session with *Toxocara canis*.

For the infestation, the soil was seeded with 10000 invasive *Toxocara* eggs and the mixture was thoroughly stirred up. Then into the mixture earthworms were added from group 1. The earthworms were kept in this soil during 4 days at the indoor temperature. The earthworms from group 2 were stored as a control group in a virgin soil.

Results**.** After the eggs cultivation till invasive stage, before the infestation, a bio-trial was taken at rodents (susceptible hosts). The infestation was conducted by the natural way of feeding laboratory mice with *Toxocara canis/cati* invasive eggs in amount of 50 pieces. On the third day after the infestation, the larvae were detected in mice' liver and the rest larvae were detected with the use of the method of digestion in artificial gastric secretion.

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The larvae *Toxocara* migration and expansion pattern was studied in the tissues of the earthworms subjected to the infestation via the soil seeded with 10000 *Toxocara* invasive eggs.

In the control group of earthworms, over the entire period of the study, the larvae were not detected. In the experimental group, the *Toxocara* larvae hatched from the eggs were registered in the skin-muscular sac and the intestines. Over the period of 55 days, we observed the larvae of the earthworms. Throughout the experiment, only two earthworms turned to be clean from the larvae. The most part of the larvae was detected at the earthworms in their intestines. The most part of the larvae were situated in one part of the intestines: they showed a crowding pattern and more frequently they were found in the medial department. Apparently, the worm larvae take nourishment there as they grow in size somewhat. This fact was recorded by Japanese investigators, and it was registered by us, too. Another aspect is of special interest. As reservoir hosts, more frequently, *Toxocara* larvae choose haematherm animals, inside of which they are able to stay in a viable state up to 6 or even 10 years, therewith not getting covered with a capsule. Earthworms are not the case; however the *Toxocara cati* larvae dwell in their intestines in the viable state during 2.5 months after exit of the chorions.

Thereafter, the larvae stay unchanged in the tissues of the earthworms and conserve their fitness for other hosts' infestation. Also in the conducted study, there was found that at a repeated *Toxocara canis* invasive eggs infestation of the earthworms *Eisenia fetida,* at the latter, a certain immunity is developed. So subsequently in the repeated case of the infested soil deglutition, the larvae penetrate into the earthworm intestines and nevertheless any entrance into its skin-muscular sac is absent. Thus, the earthworms are able to act as paratenic hosts or carrier hosts within some interval of time. (Pigs, birds, rodents and other hosts, that consume worms abundantly, can catch the infection in

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an indirect way from this source). But on the next stage, the worms play a sanitary role and even can be used for soil purification.

Conclusions. Thus, the *Toxocara canis/cati* eggs get into the earthworms *Eisenia fetida* in natural way; afterwards in their intestines they exit from their chorions. Single larvae invade into the medial and the hinder part of the skin-muscular sac. About a half of larvae become there immobile. The studies are to be continued.

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THE HYPOGLYCEMIC INDEX IN EXPERIMENTAL TYPE 1 DIABETES

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Abstract: Diabetes mellitus is a global medical-social and humanitarian problem of the XXI century. Upon detection of hypoglycemia one should eat easily digestible carbohydrates.
Key words: non-insulin tissue, insulin-dependent tissue, insulin diabetes, non-insulin diabetes, glycemia, hyperglycemia, hypoglycemia, the glycemic index

Glucose is the most important monosaccharide in humans, as glucose molecules act as a biological fuel in one of the basic energy processes in the body – in the process of glycolysis.

Major consumers of glucose are brain neurons, muscle cells and erythrocytes.

Out of 10 grams of glucose formed in the liver during one-hour rest the brain uses about six grams of glucose per hour, regardless of insulin. If the consumption of glucose by peripheral tissues is more than 4 grams per hour, the production of glucose by the liver is enhanced by enhancing its formation from glycogen, protein and fat thereby satisfying non-insulin needs of body tissues, i.e. keeping the necessary amount of glucose in these tissues.

With respect to insulin all tissues of the body can be divided into two groups [1]:

1. non-insulin tissues;
2. insulin-dependent tissues.

Non-insulin tissue cells are the cells penetrated by glucose irrespective of the presence of insulin by simple diffusion. Insulin-dependent cells are the cells whose operation depends on

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insulin either at the stage of their penetration by glucose or at the stage of intracellular processes.

The main targets of insulin are liver cells, muscle cells and adipose tissue cells.

The concentration of glucose in the blood of a healthy person is supported by a complex hormonal mechanism. The failure of this mechanism leads to metabolic disorders – carbohydrate metabolism. As a result of such failure diabetes develops.

There is a significant accumulation of glucose in the blood of the patients with this disease, which is due to the fact that glucose cannot enter the cell.

Depending on the amount of insulin produced by the body there are diabetes of two types [2]:

1. insulin diabetes (type 1 diabetes);
2. non-insulin diabetes (type 2 diabetes)

In case of violation of the mechanism of glucose penetration in insulin-dependent cells diabetes of the first type is observed. In case of violation of the mechanism of glucose penetration in non-insulin cells diabetes of the second type may occur.

Formation of strong hormonal and metabolic changes can lead to the so-called late complications of diabetes: macro- and microangiopathy, myocardial infarction, a stroke, severe vascular lesions of the retina, kidneys and other systems.

Glycemia is a certain concentration of glucose (sugar) in the blood of a human or an animal. The norm is 3,3-5,5 mmol / l in humans

Hyperglycemia is a clinical symptom indicating an increase in glucose in the blood serum, compared with the norm.

Hyperglycemia in diabetic patients is dangerous because it can rather quickly lead to diabetic ketoacidosis, which is life-threatening.

Glucose intolerance can be due to localized lesions of pancreatic islets - P-cells.

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Decrease in blood glucose levels (hypoglycemia) [3, p. 236] adversely affects the operation of all systems of the body, especially the central nervous system.

Since the brain is extremely dependent on glucose and is the first organ damaged by hypoglycemia, metabolic disorders in it may cause weakening of the sympathoadrenal response during subsequent hypoglycemias.

Hypoglycemia is able to have a serious damaging effect under the influence of which the enzymatic activity and substrate energy provision as well as plastic metabolism provision are changing.

The glycemic index [4] is a relative value to evaluate the influence of different foods on blood sugar levels.

The glycemic index of the product depends on various factors – the type of carbohydrates, the amount of cellulose it contains, the way of the heat treatment process, the protein and fat content.

For diabetics it is very important to keep to a regular meal pattern. There should be the most substantial and fiber-rich breakfast. Lunch must also be at exactly the same time – preferably in four-five hours after breakfast.

Nowadays a lot of correcting drugs have been developed especially for diabetics. These drugs can return glucose levels in blood to normal ones. Simulation of type 1 diabetes was performed by triple intraperitoneal administration of alloxan 1-aqueous ("DiaeM", Russia) in a dose of 7 mg / kg, dissolved in water for injection (JSC "Dalkhimpharm", Russia) three times at intervals of 7 days [5].

The effect of the drug "alloxan" is selective destruction of pancreatic β-cells. When administering alloxan a major cause of diabetes is a direct toxic effect on β-cells, alloxan destroys the integrity of the β-cells membrane, increases the permeability of the plasma membrane for the extracellular markers such as mannitol and inulin. In experimental animals consuming different types of correcting products we observed normalization of

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glucose content in serum to varying degrees. As a result of the experiment it can be concluded that on the background of the pathological condition characterized by severe hyperglycemia, the urinary system disorder (protein and fat metabolism) the studied corrective products have protective properties: normalization of the functions of internal organs and the hypoglycemic effect of the consumption of all study samples were observed.

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CHOLERA DYNAMICS IN ZIMBABWE FROM 1992-2012

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Abstract: The waterborne disease cholera has been endemic in Zimbabwe since the 90s. The cholera cases from the year of 2000 have been fluctuating from more than 1000 cases to more than 80 000 cases in 2008-2009 cholera epidemic. The decrease in water and sanitation from 1990 -2012 are the major reasons why cholera is endemic in Zimbabwe; rural: 71-69 % decrease in access to safe water; 35-32% decrease in sanitation, urban: 100-97% decrease in improved water; 54-52% improved sanitation. As the improved water decreased there was a significant rise in (crude Case Fatality Rate) CFRs. It was shown that the CFRs have been rising and fluctuating from 1992, the statistical analysis using Fischer rejected the null hypothesis that within this period 1992-2009 there has been a significance change in the Crude Fatality Rate.

Key words: cholera, water, sanitation, epidemic, CFR

Cholera is an infection of the small intestines by some strains of the bacterium *Vibrio Cholerae* [1]. Cholera is endemic or epidemic in areas with poor sanitation; it occurs sporadically or as limited outbreaks in developed countries. In coastal regions it may persist in shellfish and plankton.[2] The primary symptoms of cholera are profuse diarrhea and vomiting of clear fluid. These symptoms usually start suddenly, half a day to five days after ingestion of the bacteria [3].*Vibrio cholerae* is a Gram-negative comma-shaped bacterium**.** *V. cholerae* is a facultative anaerobic bacteria [4]. It has a flagellum hence ability of

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movement in water. During inter-epidemic periods, Vibrio cholera can adhere to copepods. [5]. Vibrio Cholerae tolerates alkaline media that kills most intestinal commensals, but they are sensitive to acid. In nature there are two serogroups of *V. cholerae* – O1 and O139 which cause outbreaks. *V. cholerae* O1 causes the majority of outbreaks, while O139 – first identified in Bangladesh in 1992 – is confined to South-East Asia. There are also non 01 and non 0139 strains of *Vibrio cholerae* which cause mild diarrhea. About 80% of people infected with *V. cholerae* do not develop any symptoms, although the bacteria are present in their faeces for 1-10 days after infection and are shed back into the environment, potentially infecting other people.

Among people who develop symptoms, 80% have mild or moderate symptoms, while around 20% develop acute watery diarrhea with severe dehydration. This can lead to death if left untreated [6].

In Zimbabwe, cholera is endemic with occasional outbreaks occurring since 1992[7]. Except for 1999 and 2002, the epidemics were managed using available resources without any assistance from the international community. The deterioration of water and sanitation services in Zimbabwe resulted in a cholera outbreak throughout the country in 2008-2009. There were more than 90,000 cases of cholera and more than 4,000 deaths. Beitbridge is located along the border with the Republic of South Africa and was one of the worst affected towns, accounting for 26% of all cholera cases recorded nationally [8]. The political insecurity in Zimbabwe for the last decade has severely affected all sectors of the economy including infrastructure. With limited resources for maintenance, most of the infrastructure including that of water supply and sanitation has fallen into disuse with deterioration of the services. The internal factors which contribute to water pipe bursts are: age of the pipes, water pressure, composition, joining methods, quality of initial installation, and contact with other structures, stress from traffic, frost loads, freezing soil around the pipes and rusting through

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age. Profuse is seen flowing in the streets of residential areas. Sewer and household water mix, and often the water table is contaminated by leaking sewer pipes underground, hence contaminating the wells and boreholes. (Underground water exploitation)

Sewer in the country before disposal is not treated well because of limited resources and the effluent is discarded in water source. For example, Harare sewer is discharged into Lake Chivero, which is now one of the most polluted lakes in the world. From the polluted lake that is where household water is drawn. The household water is not purified to standard well and often has a foul smell. The situation is worsened by the power cuts, the population is not able to kill bacteria through boiling as most of the time there is no electricity. Boreholes have been erected to supply residents with water, the residents who live mostly in the high density suburbs wait long hours in the queue for borehole water which sometimes can be contaminated from the sewer.

Data for cholera incidence from 1992 – 2009 and data on water and sanitation from 1990 -2015 in Zimbabwe was retrieved from the World Health Organisation country profiles and bulletins (source). Statistics from 2010 were not found, but the cholera rate in Zimbabwe is significantly low. Tables were created to show the cholera incidence from 1992-2009 and water and sanitation from 1990-2012. Scatter maps and line graphs were created in Excel to show the dynamic relationship between water, sanitation and cholera incidence in Zimbabwe. For analysis, the Fischer test was used to test whether there was a significance change in crude Case Fatal Rate (%) from 1992-2009.

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Results

Table 1: Trend of cholera incindence in Zimbabwe from 1992-2009

http://www.who.int/cholera/countries/ZimbabweCountryProfileOct2009.pdf) [9]

Year	Cases	Deaths	Cfr	Year	Cases	Deaths	Cfr
1992	2048	57	2,8	2001	649	13	2
1993	5385	323	6	2002	3684	354	9,6
1994	3	0	0	2003	879	19	2,2
1995	0	0	0	2004	125	10	8
1996	0	0	0	2005	231	15	6,5
1997	1	0	0	2006	789	63	8
1998	883	46	5,2	2007	65	4	6,2
1999	4081	240	5,9	2008	31921	1596	5
2000	1911	71	3,7	2009	66664	2667	4

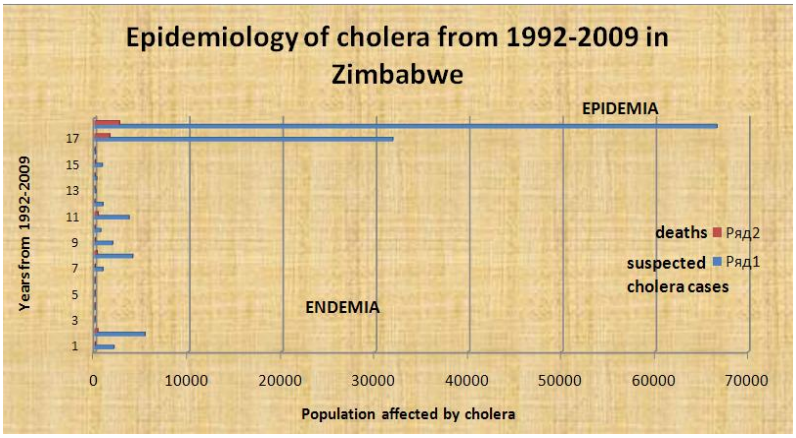

Figure 1: Epidemiology of cholera in Zimbabwe from 1992-2009

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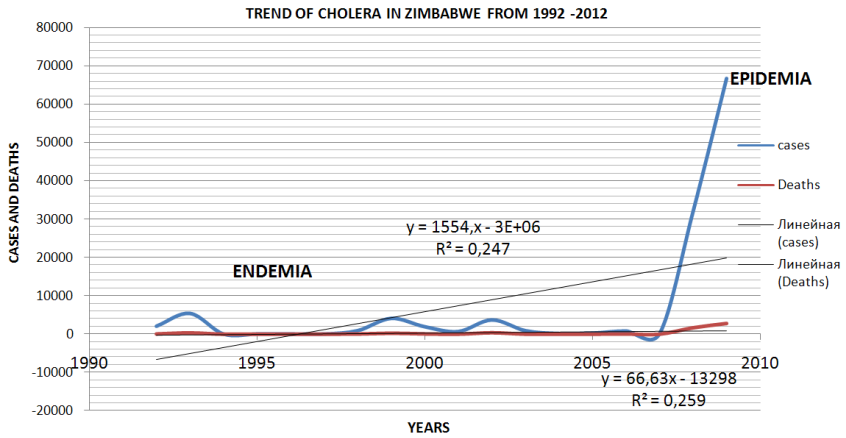

Figure 2: Cholera dynamics in Zimbabwe from 1992-2012

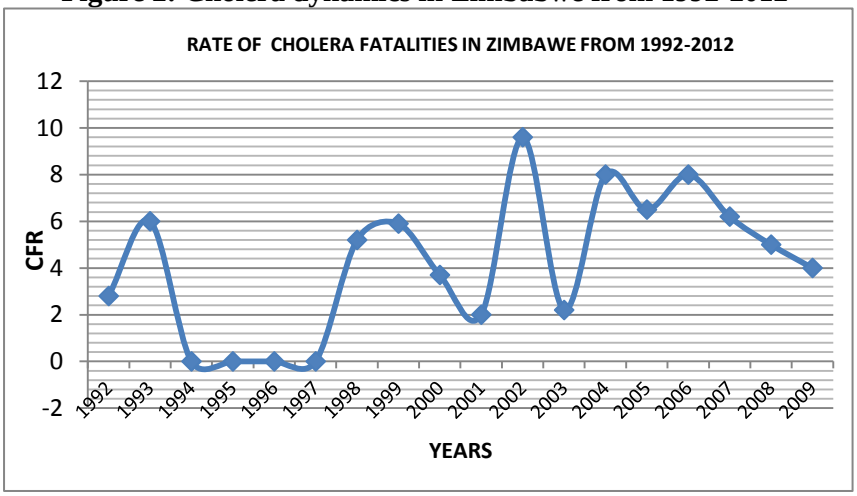

Figure 3: Cholera crude Case Fatality rate from 1992 –2009

Cholera in Zimbabwe is endemic, but the recorded cholera cases have tremendously increased from 2000. This is mainly due to the broken down sanitation which continues to decrease every year. Water is vital and its purity is essential. In Zimbabwe the access to clean water is decreasing every year posing the population to risk of water borne diseases like cholera. Table 1 shows s that the cases were profoundly high in 2008 -2009 and this period was

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pronounced an epidemic ,the CFR of (5,4) was lower than that of the previous years ,1999: 5,9; 2002 :9,6; 2005:6,5;2007:6,2. The ratio of the cholera cases and case fatal rate was high hence a low CFR. Comparing the recorded cases 2008-2009 and other years the cholera incidence was very high.

The water and sanitation in Zimbabwe has been deteriorating, leading to a decrease in population of people with access to clean water and sanitation this is the main reason why cholera remains endemic in the country and the reason for the 2008-2009 outbreak (Table 2). Access to clean water was summarized (urban and rural) and compared to CFRs from 1995-2005 (data used 1995, 2000, 2005). Figure 4 shows that as the access to water decreased cholera CFR increased, and from the graph it can be concluded that decrease to access of clean water leads to a rise in cholera incidence. Statistically using Fischer test for analysis there has not been a significant change of CFRs in Zimbabwe from 1992-2009. The crude Case Fatal Rate has been constant from 1992 -2009.

Table 2: Trend in water and sanitation in Zimbabwe from 1990-2012

Source: www.wssinfo.org/data-estimates/tables [10]

	Population using improved water (%)			Population using improved sanitation facilities (%)		
	Rural	Urban	Total	Rural	Urban	Total
2012	69	97	80	32	52	40
2010	69	98	80	33	52	40
2005	69	98	80	33	52	40
2000	70	99	80	34	53	40
1995	70	99	79	35	53	41
1990	71	100	79	35	54	41

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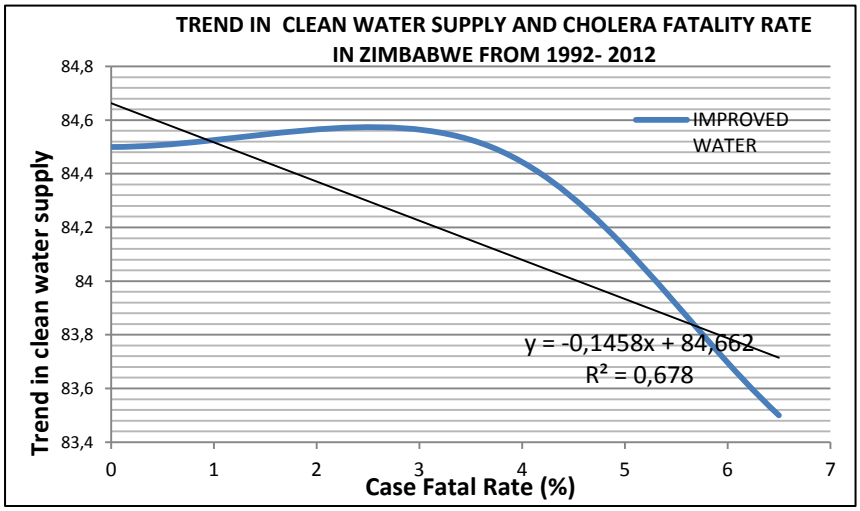

Figure 4: Graph showing the relationship between clean water supply and crude Case Fatal Rate (CFR) from 1995 -2005

Conclusion

Water and sanitation in the country are vital, and they should be maintained in order to guard against risk of water borne diseases. The government of Zimbabwe should improvise on how to maintain water and sanitation infrastructure to provide the population with uncontaminated water. The policy and town planners should have a forecast plan on how to accommodate the increasing population in the cities, by maintaining water and sewer pipes and increasing their numbers to accommodate the growing population in urban areas. When the water pipes are not maintained and the sanitation continues to decrease, they might be another outbreak in the near future.

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CHARACTERISTICS OF POPULATION MORBIDITY IN THE WESTERN ADMINISTRATIVE DISTRICT OF MOSCOW.

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Abstract. In this article, we present an overview of medical emergency calls in one municipal polyclinic of Moscow in March 2014, depending

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on the phases of the moon and geomagnetic conditions in order to identify the most environmentally unfavorable place of residence (factors of noise, air pollution). The general structure of adult population morbidity in the western district of Moscow has been studied.

Key words: non-contagious disease, medical emergency

Introduction.

With the vaccines implementation in the second half of the 20th century, infectious diseases have ceased to be a major cause of death rate of population. However, with the accelerated pace of development of humanity changed lifestyle has accelerated the pace of information processing, the person becomes more susceptible to stress, which leads to an additional load on the internal mechanisms of self-regulation. As a result the diseases of the infections nature came to the fore, and among them on the first place cardiovascular diseases, cancer and pathology the locomotor apparatus. The most vulnerable sections of the population are older people who are meteodependent and sensitive to changes in the geomagnetic field and the state of the atmosphere. In addition, many studies confirm the relationship between the development cardiovascular disease with seasonality and geomagnetic activity. The combination of all these factors makes the social and physiological human environment and has a direct relation to his environment.

Materials and Methods.

Our study was conducted from April 2014 to this day, during which we have studied the dynamics of morbidity in ZAO of Moscow, based on the analysis of physicians and emergency medical information card accounts 110 / y.

It is known, that the overwhelming number of cases of disease are fixed in history of the patient's references to various risk factors which could give effect to the development of exacerbations of the disease. They include unhealthy habits

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(smoking and alcohol abuse), obesity, physical inactivity, stress (acclimatization, physical or emotional stress), sleep disturbances, unbalanced diet with a high content of cholesterol and other elements of an unhealthy lifestyle.

In this study, it was necessary to determine the frequency of occurrence of different types of diseases among the population in Moscow western district, to follow the effect of seasonality and geomagnetic activity on the dynamics character of the disease.

Results

Fig. 1 shows the total number of emergency calls daily, for one of the considered month (March). We can see that in just a month in 1032 calls were carried out, but in the month of March 2014 on the average 33 calls per day were carried out. Black color marked day, when there was a new moon, amber - full moon.

Domodedovskaia metro station and Kashirskoye avenue are leading. It is due to the fact that these streets are the most populous and largest territorial areas and as a result there are a variety of adverse environmental factors: noise, air pollution, exhaust emissions.

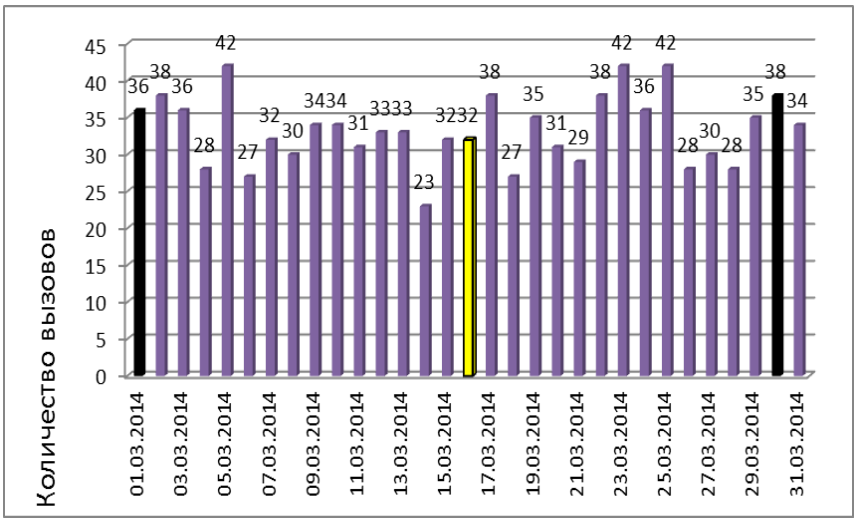

Fig.1. Total number of calls of Emergency Physicians

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in the Moscow central district in March, 2014

The structure of general morbidity of the population of the areas under consideration.

We can see that the most common diseases such as GB (hypertension), ARI (acute respiratory infection), dorsopathies, a group of diseases affecting the spine, muscle tissue back or limb. During processing it has been identified the character of the influence of various factors causing exacerbation of different diseases of the adult population and in details considered the contribution of each to the overall picture of morbidity.

Exacerbation of diseases such as hypertension, SARS, etc. has been linked with seasonality, age, way of life of patients, busy streets and population density.

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THE OVERLOOK TO PARTICULATE MATTER

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Abstract: These days it is difficult to find someone who is not informed about the air pollution problem all around the world especially in urban areas. Adverse effects of pollutants especially on human health and also transmission of them from one place to other

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places indicates that more attention is needed on controlling and mitigation of air pollution. According to importance of particular matters in causing air pollution and its serious health effects on human in this paper, after briefly discussing about different sources of particular matter, its effect and control methods of this pollutant are discussed.

Key words: air pollutant, particulate matters, control methods

Air pollution has been a problem since the planet excited. Natural air pollution sources have been such as, natural fires, volcanos, desert dust and etc. First emission of air pollutants by human refers to when they burned wood and cleared land [1, p. xvii].

According to definition of air pollution by WHO, Biological, physical, or chemical agents which change the natural characteristics of the atmosphere can cause contamination of indoor and outdoor environment. WHO declares that pollutants which have major effects on public health include ozone, carbon monoxide, nitrogen dioxide and sulfur dioxide [3].

Based on WHO declaration, 3.7 million premature deaths worldwide per year in 2012 was estimated which were caused by outdoor air pollution; and also it is declared that , particulate matter (PM10) was responsible of this mortality by causing respiratory and cardiovascular disease and also cancers [4]. Aside from health concerns, particulates can make life difficult by reducing visibility when released in the atmosphere [2]. Due to importance of particulate matters on human health, nature of these pollutants and method of controlling is discussed below:

According to the definition of PM given by WHO, sulfate, ammonia, sodium chloride, nitrate, mineral dust, black carbon and water are principal components of particulate matter. [4].

Since particles which have impacts on health are particles with specific range of diameters, it is important to know how

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these particles are classified. They are distinguished by their sizes:

1. Particles with diameter less than 10 μm known as PM_{10}
2. Particles with diameter less than 2.5 μm known as $PM_{2.5}$
3. Particles with diameters less than 1 μm known as $PM_{1.0}$

Particles with diameters 2.5 to 10 are often called coarse particles, and PM2.5 are famous as fine particles, and also there is another title for particle which is ultra-fine particles that belong to particles whit diameter less than 1 μm [5].

Now that we know about categories of particles, it is important to know from which sources emitted these ones into the air; mechanical, chemical and biological are origin sources that these particles are generated by. Therefore they can be emitted from human activity sources or from natural sources. [5] Particulates may also be classified as below:

1. primary—emitted directly from a process
2. secondary—subsequently formed as a result of a chemical reaction [8]
3. re-suspended – after deposition, then particulate matter can return into the air through wind action or road traffic disturbance in urban areas [5]

The atmospheric particles are primary particles, which are formed during combustion, or chemical or physical processes in the engines, the combustion chamber, the industrial installation and other processes, incl. natural processes like wind erosion. The primary particles can also be defined to include particles formed immediately after the emission during the cooling process, e.g. a few tenths of a second after emission from the exhaust pipe from motor vehicles. Secondary particles are particles formed by nucleation, condensation or other processes, where gaseous pollutants or natural gases are involved in particle formation or growth [8].

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As it is said above, because of small size of particles and various sources that generate them these days we face real problem caused by these pollutants. Most important issue is impacts of PM on health. So that, studying particulate matters and methods of controlling them becomes very important since they have impacts on health.

The role of particles with diameters less than 10 μm in causing heart and lung disease and also deaths from these diseases are studied. It is also said that these particles have affected in both short-term and long-term exposures. Children, people with lung or heart disease and elderly people are among sensitive groups for particulate matter [6].

Different researches say that, there is an association between exposure to increased levels of particulate and increasing of cardiovascular events including hospitalization for myocardial infarction, arrhythmias, angina, and stroke [7, p.128].

Definition of PM and its resource and also its effects were mentioned above. Now, in order to explain methods of air pollution control, specifically control of PMs first another classification of air pollution is explained and then methods of control will be explained.

Under the state of matter, there exist the classifications particulate and gaseous. Although gases need no introduction, particulates have been defined as solid or liquid matter whose effective diameter is larger than a molecule but smaller than approximately 1000 mm (micrometers). Particulates dispersed in a gaseous medium may be collectively termed an aerosol. The terms smoke, fog, haze, and dust are commonly used to describe particular types of aerosols, depending on the size, shape, and characteristic behavior of the dispersed particles [9, p 2].

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In this part, control of particulate matters methods will be introduced:

The overall collection/removal process for particulates in a fluid essentially consists of four steps.

1. An external force (or forces) must be applied that enables the particle to develop a velocity that will displace and/or direct it to a collection or retrieval section or area.
2. The particle should be retained at this area with strong enough forces so that it is not reentrained.
3. As collected/recovered particles accumulate, they are subsequently removed.
4. The ultimate disposition of the particles completes the process.

The forces listed below are basically the "tools" that can be used for particulate/ recovery collection: 1. Gravity settling 2. Centrifugal action 3. Inertial impaction and interception 4. Electrostatic attraction 5. Themophoresis and diffusiophoresis 6. Brownian motion all of these collection mechanism forces are strongly dependent on particle size. Each mechanism is briefly described below [9, p 249-250].

The gravity settler was one of the first devices used to control particulate. It is an expansion chamber. This chamber is a place that reduces speed of gas, thus the particle has time to settle out under the action of gravity. This chamber's use in industry, however, is generally limited to the removal of larger-sized particles, e.g., 40–60mm in diameter. Settling chambers have also been used to study the flow of particles in a gas stream. The data generated from these studies can be useful in the design of other particulate emission control devices.

There are basically two types of dry gravity settlers: the simple expansion chamber and the multiple-tray settling chamber [9, p 315].

Cyclones provide a relatively low-cost method of removing particulate matter from exhaust gas streams. In comparison with gravity settling chambers, cyclones are more complicated in

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design, and their efficiency of removing is much better than what we have in gravity settling chambers. However, cyclones are not as efficient as, baghouses, venture scrubbers and electrostatic precipitators but are often installed as precleaners before these more effective devices. In this system, particles enter the device with the flowing gas. the gas stream is forced to turn, but the larger particles have more momentum and cannot turn with the gas. These larger particles impact and fall down the cyclone wall and are collected in a hopper. The gas stream actually turns a number of times in a helical pattern, much like the funnel of a tornado [9, p 361].

Electrostatic precipitators are unique among gas cleaning equipment in that the forces separating the particulates from the gas stream are applied directly to the particulates themselves, and hence the energy required to effect the separation is considerably less than for other types of gas cleaning apparatus. Gas pressure drops through the precipitator may be of the order of 1 inch of water or less as compared with pressures of up to 10–100 inches of water for scrubbers and baghouses. This fundamental advantage of electrostatic precipitation has resulted in its widespread use in applications where large gas volumes are to be handled and high efficiencies are required for collection of small particles. The removal of fly ash from the discharge gases of electric power boilers is the largest single application of precipitators, both in number of installations and in the volume of gas treated.

The electrostatic precipitation process consists of three fundamental steps:

1. Particle charging
2. Particle collection
3. Removal of the collected dust [10, p 399-400]

As the name scrubber implies, wet collectors or wet scrubbers are devices which in liquid is used to remove particles or polluted gases from an exhaust gas stream. Some techniques such as water sprays, films or sheets of liquid, and beds of plastic

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spheres covered with liquid can be used in these scrubbers. These techniques can remove PMs. They can also effectively remove gases such as HCl or SO2, but removal conditions must be right. In addition, gas–liquid contact can bring about gas coditioning, and to a lesser extent, liquid conditioning [9, p 451].

One of the oldest, simplest, and most efficient methods for removing solid particulate contaminants from gas streams is by filtration through fabric media. The fabric filter is capable of providing high collection efficiencies for particles as small as 0.1mm and will remove a substantial quantity of those particles as small as 0.01mm. In its simplest form, the industrial fabric filter consists of a woven or felted fabric through which dust-laden gases are forced. A combination of factors results in the collection of particles on the fabric filters. [9, p 503]

One area that has recently received some attention is hybrid systems—equipment that in some cases operate at higher efficiency more economically than conventional devices. Tighter regulations and a greater concern for environmental control by society has placed increased emphasis on the development and application of these systems. Hybrid system is a combination of controlling methods in one devise [9, p 549].

Importance of breathing clean air and concerning about the air which is enters into our bodies through respiratory system, demonstrates as an important issue day by day. On the other hand, today critical situation of air pollution is clear to everybody. Due to effects of air pollution on human health and also high growth rate of associated diseases, it seems to be necessary to increase number of air pollution measuring devices and recording every changes in rate of air pollutants per hour, day, month, and year and paying attention to every single changes and growth of air pollutants in order to prevent or at least decrease the adverse effects on society health and also ecosystem. Since particulate matters can have sever effects on health and has become an important issue especially in least developed countries, it is

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important to study more about them and also implying efficient control methods to remove them.

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OCCUPATIONAL CONDITIONS OF ORCHESTRA MUSICIANS

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Abstract: This article describes the working environment of the musicians of the leading orchestra of Russia. The composition and the location of the musicians in the orchestra, occupational diseases and prevention methods are considered. Harmful factors affecting the musicians are identified. Research of sound pressure level was conducted.

Key words: occupational factors, the sound pressure level, a musician.

Playing musical instruments, if ignore the aesthetic concepts of higher art - is a typical career with its ergonomic and physiological parameters - severity and intensity. Musicians can not notice the objectively existing physical fatigue, nervous strain.

According to statistics about 90% of musicians around the world have occupational diseases. Hours of rehearsal, constant moving and stressful situations increase the stress on the functional systems of the musician. Nowadays, there are a hundred diseases associated with playing a musical instrument. [4]

Russian researchers conducted a study and revealed the severity of the occupational factors of the labor of the musicians, such as dynamic load, the number of stereotyped movements of

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the workers, a form of working posture, as well as the noise load on the body. The impact of the sound pressure on the musicians increases especially when it comes to orchestral groups.[1]

The orchestra is a group of musical instruments, which perform works that are created specifically for a given composition.

Depending on the composition the bands have different names. It depends on their expressive, dynamic and timbral possibilities. The bands are divided into:

- Chamber orchestra of folk instruments,
- Symphony Orchestra (big and small)
- Variety
- Brass
- Jazz

The instruments are divided in the the following groups:

Group 1: strings are cello, viola, violin, double bass.

Group 2: wood wind are gobo, flute, bassoon, clarinet.

Group 3: brass are trumpet, french horn, tuba, trombones.

Group 4: Drums are:

a) rattles, noise: castanets, maracas, tom-tom drums (snare drum and bass drum);

b) with a certain pitch: cymbals, timpani, triangle, xylophone, bells, celesta, vibraphone.

Group 5: keyboards (organ, piano, clavichord, harpsichord).

Conductor – translates as to manage, he directs the musicians – performers, determines the character of the sound of the orchestra, he owns the artistic interpretation of music. [5]

The sonority of the orchestra depends on the arrangement of the groups of musical instruments with respect to each other Only at certain seating of the musicians it is possible to achieve the desired intensity of the sound, it is connected with different levels of intensity of the sound of each instrument. If to look at the scheme of the symphony orchestra, we can understand that the musicians sit in a certain order. Some time ago, all the musicians of the orchestra in the world, sat in the same way. The

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first violin sat on the left (the main instruments in a symphony orchestra, performing expressive melodies), the second violins sat on the right behind them, cello is a center of the hall, followed by - woodwinds. Nowadays there are several options of seating the orchestra musicians. It depends on the decision of the conductor, and on the particular piece of music. But over time it remains unchanged that the tools are always arranged in groups. Brass are located next to each other, all the woodwinds are also located nearby, bowed strings are grouped separately.

Layout of tools in one of the modern orchestra is presented in Figure 1.

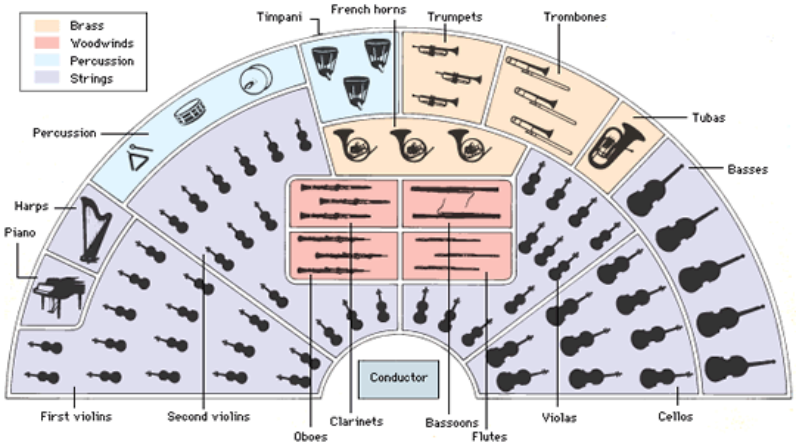

Fig.1. Arrangement of instruments in the orchestra

Given the proximity of the tools to each other and the volume of executable pieces of music, one of the main factors of production, affecting the body of musicians, is the noise.

Fig. 2 shows a frequency range of the main groups of instruments (string bow, brass, percussion), which are used in the symphony orchestra. The spread frequency is very high, ranging from 28 Hz to 3951 Hz. Thus during the working day the musicians are exposed to the low frequency band (below 400

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Hz), midrange (400 to 1,000 Hz) and high frequency (above 1000 Hz) of noise.

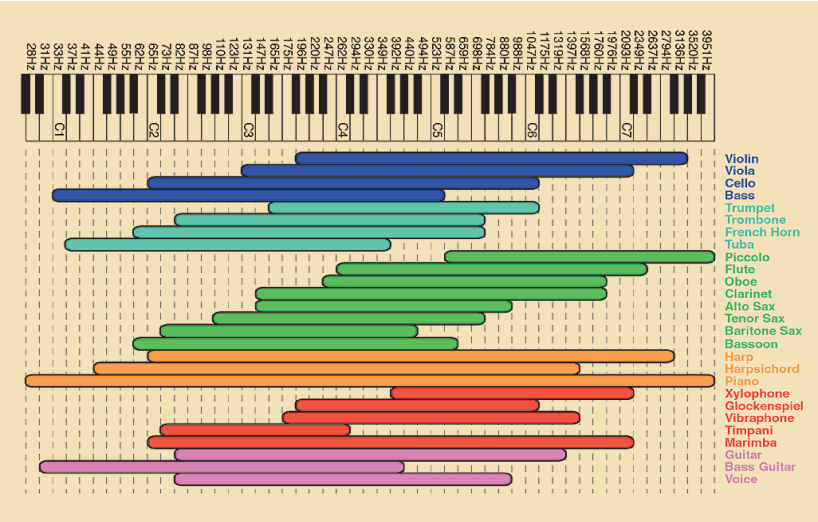

Fig. 2. The frequencies of musical instruments

It should be noted that it is impossible to make a complete picture of the volume of musical instruments (dBA). This is due to different frequencies, which are perceived differently by man as loud. Sounds that have very high or low frequency, are felt by man quieter than the sounds that are located in the middle zone.

As the results of measurement (for example, one of the contemporary Moscow band), there is excess of the permissible sound pressure levels by an average of 5-7 dB. [2] At the same time, the greatest deviation from the remote pointed in the workplace musicians brass and percussion instruments (10-14 dBA). Excess explains the features of the structure of the instrument, as well as exposure to high sound pressure level of the neighboring groups of instruments. [3]

Thus, to reduce the impact sound pressure on the body of musicians, it is recommended to take breaks more frequently.

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INFLUENCE OF ENVIRONMENTAL GROWTH ON THE DEVELOPMENT OF SOCIAL ECOLOGICAL ADVERTISEMENT

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Abstract: In order to make public service advertisements more efficient many aspects should be taken into consideration. It refers also to the ecological public service advertisements and their functions in the modern society.

Key words: ecology, public service advertisements (PSA), public service ad, society.

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Among the advantages of public service ads we can list the following: shaping of public attitude, transfer of value, involvement of the citizens into the social life and, as a result, humanization of the society. Disadvantages of the domestic PSA are based on its financial ambiguity in the legal sphere, the difficulties of its positioning and also on the practical impossibility to evaluate the results. PSA can be ordered by any subject, but usually it is ordered by the local or state authorities or by the non-profit organizations.

The effect of PSA depends on various factors (provision of proper technical equipment, broadness of audience, quality of the illustrations and provability of information, etc.). But the efficiency of the certain PSA is rather difficult to count, because PSA promotes not goods or services, but a certain attitude which can or cannot show itself only in long-term perspective. And the result cannot be predicted in the most cases.

According to H. D. Lasswell, nowadays persuasion and argumentation should be used to change public opinion. This principle is also a starting point for any PSA [1].

According to R. Harris, there are the following effects of the PSA: the changes of the behavioral attitudes, knowledge and ways of thinking, and also changes of the physiological reaction [2]. The sphere of the influence is rather wide; however the effect of the PSA is often unpredictable, because instead of the desirable effect one can get the boomerang effect, i.e. the effect totally opposite to the desired one.

The process of the PSA influence on the audience can be described the following way. PSA is an indispensable element of any social work. PSA can change the opinions and value orientations of people, but it is necessary to change the behavior. And this task requires more motivation, which, in turn, begins to influence the ways the person uses to meet the needs [3].

It is important to notice that nowadays most PSAs have rather low quality; their creator do not take into account the

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psychological, social and economic characteristics of those groups of people at which the certain PSA is aimed.

To sum up, in order to be efficient PSA should be created with the features of the audience and the possible effects taken into the account. Only in this case PSA will influence in the desirable way. The consumer of the PSA will reflect not only on the advertisement itself, but, which is most important, on the danger of his or her behavior, the consequences of which can be devastating not only for humans, but also for a society as a whole.

Though the sphere PSA application is rather wide, we can enumerate four main groups of the problems PSA deals with:

1) fight against the disadvantages and threats; prevention of environmental disasters or unwanted consequences; declaration of the charitable purposes;

2) declaration of the values (health, career, children, family, safety, etc.);

3) calls for reforms based on the desire to achieve social and personal ideals;

4) social therapy, which is used in cases where negative emotional states and feelings become mass (fear, anxiety, concern for their fate and the fate of loved ones, depression, etc.).

So the mission of PSA is behavioral change of the society. PSA is an effective means of combating social evils. As a messenger of social change PSA draws the desired image of the world. PSA can be divided into two groups, though this division is rather relative: values advertising and informational advertising. The first group is designed to implement or fix the specific values, rules and regulations; the second is used to promote social programs and services of the organizations. The main point for the informational PSA is presence of feedback: it should clearly indicate the number of "hot" line, a list of facilities, services, non-governmental organizations (preferably with addresses and e-mail), dealing with this issue, etc.

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Consider the types of environmental problems that can be solved by the environmental marketing. The main problems of the environmental marketing are as follows:

1) greening of business;

2) shaping of environmental awareness among consumers;

3) recreational nature management, aimed at the development of mechanisms Urbanized marketing because city residents are the main consumers of non-environmental products and services and also they form a high demand for organic products.

According to the research, there are following strategies of the state ecological policy:

1) to raise public environmental awareness;

2) to improve the environment situation and the environmental safety;

3) to achieve the human health safety for status of the environment;

4) to integrate the environmental policy and improve the integrated environmental management;

5) to stop the loss of biotic and landscape diversity and to form an ecological network;

6) to ensure the balanced usage of natural resources;

7) to improve the regional environmental policy.

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SUFFICIENCY EVALUATION OF WATER SOLUBLE VITAMINS (VITAMINS C, B1, B2, B6) BY NONINVASIVE METHODS

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Abstract: Deficiency of vitamins in children is detrimental to health, increasing the risk of violations of the physiological development of children, respectively, reduction of protective functions of the body. 49 children attending pre-school educational institution were estimated for the sufficiency of vitamins C, B1, B2 and B6 by non-invasive methods. Children who took vitamin complexes, were healthy and were provided with vitamins B1 and B6. These data suggest the usefulness of children's vitamin supplementation.

Key words: vitamins, children, deficiency, damage, development, results, security, non-invasive methods, vitamin - mineral complex.

In terms of economic instability nutrition structure is undergoing a significant change in the direction of worsening imbalance of the main components of the diet. Epidemiological studies conducted by the Institute of Nutrition in different regions of Russia over the past few years show that the structure of nutrition has a significant deviation from the formula of balanced nutrition, especially in terms of consumption of micronutrients, vitamins, minerals, trace elements, fatty acids, many organic compounds of plant origin that are critical in the regulation of metabolism and function of individual organs and systems. [1, pg. 39]

Power folding structure is a severe blow to the body's defense system by inhibiting the reaction of nonspecific resistance, creating and causing the formation of risk factors for many diseases.

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The objective was to evaluate with the use of non-invasive methods (excretion of vitamins with urine) the sufficiency of children attending preschool institutions with vitamins C and Group B.

A survey of children in the winter-spring period in 2015 was carried out after signing the informed consent of their parents on the basis of the kindergarten №44 "Pal" pos. Podosinnikov Dmitrov District, Moscow Region (Head Kiriyenko EV). Collecting urine held Marchenko GV. [2, pg. 10]

The study protocol was approved by the ethics committee of Institute of Nutrition. We observed 49 children (26 boys and 23 girls) between the ages of 4 to 7 years (mean age 5,7 ± 0,7 years). Physical development of the majority of children was in line with age regulations.

Sufficiency with vitamins was estimated by excretion of vitamins or their metabolites in the morning portion of urine collected during 40 - 150 min. on an empty stomach. Ascorbic acid was determined by visual titration with Tilemans' reagent [3, pg. 53]; Riboflavin – by spectrofluorimetric titration with riboflavin-binding apoprotein [4, pg. 41]; 4 pyridoxic acid – by fluorescence method. Valid values obtained in previous studies [5, pg. 10] were used as criteria for vitamin status assessment. Children with indicators below the lower limit of norm were considered to have inadequate supply with vitamins.

Significant differences fraction assessed by the Fisher test.

The children in the target group of the physiological rhythm of the power saved during the week in accordance with the approved (SanPin 2.4.1.3049-13) diet and a specially designed menu in the children's preschool educational institutions.

At home in the target group of children was characterized by more frequent consumption of foods of animal origin, containing up to 30% of saturated fatty acids, but less frequent consumption of vegetables, fruits, juices, fish and vegetable oil.

The results of evaluation of vitamin status demonstrate that 34.7% of the children surveyed had reduced levels of vitamin C

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and B6. Decreased levels of vitamin B1 and B6 were detected significantly more frequently - in 61,2-71,4%. Vitamin C deficiency was caused by insufficient intake of fresh fruits and vegetables - about 33% of children consume them several times a week or even less frequently. At the same time in 6 of 49 children vitamin C excretion exceeded the upper limit of the norm.

As can be seen from Figure 1, only 22.4% of children were sufficiently supplied with all the investigated vitamins. Polyhypovitaminosis was detected in 44.9% of children.

The dependence of vitamin excretion from vitamins and minerals intake has been analysed. Vitamin B1 and B6 excretion (per creatinine) in children who received supplements was significantly higher. (Fig. 1. Analysis of excretion).

Dependence of vitamin C could not be detected, due to the large scatter of the data.

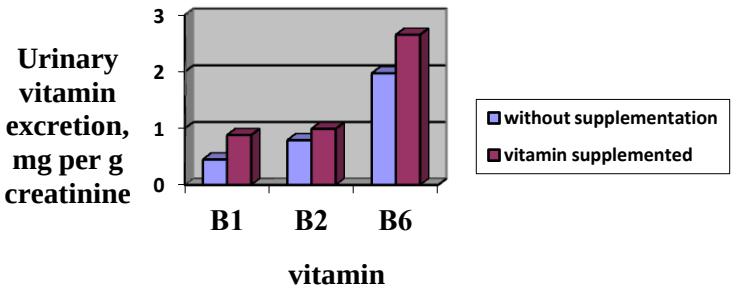

Fig. 1. Analysis of excretion.

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ASSESSMENT OF MEDICAL AND DEMOGRAPHIC SITUATION IN THE LARGEST CITIES OF VIETNAM

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Abstract: The article is devoted to studying the ecological development of the Republic of Vietnam and analyzing its health situation. The environmental damage due to the economic activity in the major cities (Hanoi, Hai Phong, Hue, Da Nang and Ho Chi Minh

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City) results to the significant increase in morbidity and infant mortality.

Key words: environmental development, morbidity, infant mortality, major cities.

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ОЦЕНКА МЕДИКО-ДЕМОГРАФИЧЕСКОЙ СИТУАЦИИ В КРУПНЫХ ГОРОДАХ ВЬЕТНАМА

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Аннотация: статья посвящена изучению экологического развития страны и состояния здоровья населения Республики Вьетнама. Отмечается, что хозяйственная деятельность в крупных городах (Ханой, Хайфон, Хюэ, Дананг и Хошимин) страны наносит ущерб в окружающей среде. Как следствие, отмечен рост заболеваемости населения и детской смертности.

Ключевые слова: экологическое развитие, окружающая среда, заболеваемость населения, детская смертность, крупные города.

Демографическая ситуация в пяти городах Республики Вьетнам характеризуется небольшим снижением по рождаемости. Данные показатели по рождаемости пяти городов (Ханой, Хайфон, Хюэ, Дананг и Хошимин) с 2009 по 2013 гг. представлены на карте.

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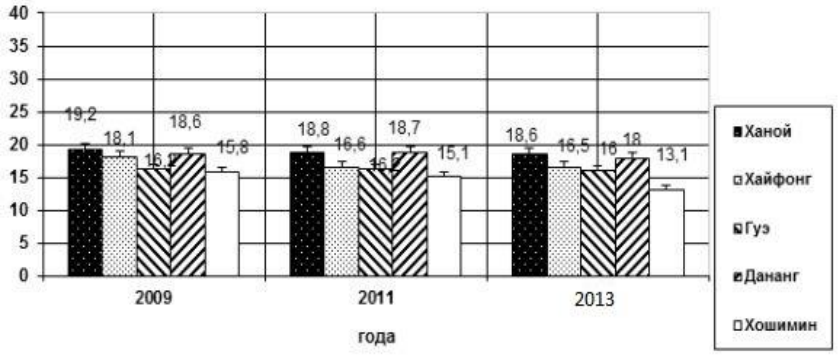

Рис. 1. Динамика рождаемости в 5-ти крупных городах с 2009 г. по 2013 г. (показатель рождаемости на 1000 человек)

Из рисунка видно, что численность за представленный промежуток времени практически не менялось. Это связано из-за проводимой на государственном уровне компании, направленной на усиление контроля над рождаемостью под лозунгом: «В одной семье – не больше двух детей» (Вьетнам и АСЕАН, 2007).

Вследствие высокого уровня загрязнения воздушного бассейна отмечены частые случаи отравлений населения в исследуемых территориях. Так оксид серы при отравлении проявляется в таких признаках как кашель, насморк, удушье, расстройство речи и рвота. Физиологическое действие оксидов азота на человека имеет сходный механизм воздействия угарного газа на организм человека – переводит кислород в связанную форму. Окись углерода (угарный газ) является очень опасным, вызывая отравления и даже смерть. И наконец, мелкодисперсные частицы диаметром 10 и менее микрон по данным ВОЗ становятся причиной 9% смертей от рака легких, 5% смертей сердечно-сосудистой системы.

Болезни органов дыхания занимают первое место в структуре общей заболеваемости населения 5 крупных городов. Выбросы загрязняющих веществ в атмосферный воздух могут быть причиной этих заболеваний.

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Основными причинами смертности в 5-ти крупных городах среди взрослого населения Вьетнама были: болезни органов дыхания, болезни систем органов пищеварения, травмы и отравления, инфекционные болезни, новообразования. Показатели младенческой смертности детей в возрасте до одного считаются самым чувствительным индикатором условий жизни населения любой страны. На этом фоне отмечается рост показателей детской смертности. Этот показатель в пяти городах за 3 года (с 2009 по 2011 гг.) был следующим: в Ханое с 6,1 до 6,8 ребенка на 1000 чел., в Хайфоне с 7,5 до 7,7 ребенка, в Хюэ с 7,0 до 7,7 ребенка, в Дананге с 6,7 до 6,8 ребенка, в Хошимине с 6,3 до 6,7 ребенка Группа основных причин младенческой смертности связана с патологией перинатального периода – на первом месте, врожденные аномалии – на втором; болезни органов дыхания – на третьем, и инфекционные и паразитарные заболевания на четвертом.

Самая высокая младенческая смертность в Ханое, Хайфоне и Хюэ. Анализ социально-экономического развития страны и состояние окружающей среды

Вьетнама показывает, что младенческая смертность является следствием недостаточного 315 уровня развития сети качественных и общедоступных учреждений здравоохранения, состоянии уровня благосостояния населения, питания, росте цен на лекарства и услуги медицинских учреждений.

Изменение здоровья населения является не только существенным показателем экологического состояния территории, но и его важнейшим социально-экономическим следствием, которое должно определять ведущие направления в улучшении качества окружающей среды.

Заключение. Высокая хозяйственная деятельность в крупных городах Вьетнама (Ханой, Хайфон, Хюэ, Дананг и Хошимин) ведет к резкому ухудшение санитарно-

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экологическому состоянию данных территорий, что отражается на здоровье населения горожан и особенно на показателях младенческой смертности.

Помимо этого на младенческую смертность влияет слабый уровень развития сети качественных и общедоступных учреждений здравоохранения, росте цен на лекарства и услуги медицинских учреждений.

Болезни органов дыхания занимают первое место в структуре общей заболеваемости населения 5 крупных городов. Выбросы загрязняющих веществ в атмосферный воздух могут быть причиной этих заболеваний.

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PSYCHOLOGICAL BARRIERS OF KAZAKH STUDENTS AT THE PREPARATORY STAGES OF EDUCATION IN RUSSIAN UNIVERSITIES

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Abstract: The preparatory phase is appeared to be the initial stage of vocational education, it is aimed to provide the ability of foreign students to be taught in the various conditions of non-native educational and socio-cultural space. In this research the psychological barrier phenomenon is demonstrated and analyzed specifically for the Kazakh students in higher education establishment.

Key words: psychological barriers, foreign students, the preparatory phase, adaptation, university education, megalopolis, environmental factors.

The efficiency of any human activity including cognition is determined by many factors among which the crucial role is taken by the ability to overcome the obstacles on the way of achieving the assigned goal. The psychological barriers(mental conditions that impede concentration, concentration of mind, strength of will and attention, which are supposed to solve the assigned problem) are the impediments that lower the efficiency on the preparatory stages of learning. They slow down the thinking processes and do not allow even gifted students to fully disclose their intelligence, to render or to realise the acquired knowledge and skills.

In the pedagogy the psychological barrier can be submitted as anything that is able to hinder the training and development of the student as a person, ultimately reduces their effectiveness.[1]

Pleasure, which gives us the labor process, is mostly the pleasure connected with overcoming difficulties ... "Also R.H.Shakurov develops this idea:" Truly , what does constitute

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our life? It consists of barriers - physical, spiritual, social, values, information, etc. - in order to satisfy our needs. In the words of a classic, "life is a struggle." The idea of the creative function of the psychological barrier is revealed in the works of Kedrov, B.D. Parygina.

Thus, the concept of psychological barrier has a dialectical contradiction, permitting to consider it as a difficulty and an obstacle on the one hand, and as an incentive, a mandatory attribute of the activity on the other. Overcoming the psychological barriers which appears as an obstacle to the normal training in the preparatory stages foreign students do not only develop intellectually and emotionally, but also learn to make their own constructive decisions, to find way out of the difficult situations, solve business and domestic conflicts, express and defend their position in the society. [2]

The problem of overcoming psychological barriers is becoming even more topical if Kazakh students are taught in non-language universities. This type of training requires a professional knowledge of foreign language, which poses a number of difficulties. The necessity to adapt to a new life, university education system, but also to Russia, which has its own characteristics compared to other educational systems. Also the difficulties of studying special subjects through foreign language, in a new language and cultural environment. Learning a different language requires a lot of effort and energy, as well as the daily, systematic, motivated work. All this results into a sense of insurmountable difficulties related to language learning and adaptation process. [3]

At the preparatory stage, there are emotional, psychological, personal psychological barriers. Kazakh students favor for fatigue, bad mood, etc. Other barriers arise during the classes Students in order to accomplish their goals in studying should concentrate on special subjects using different types of speech activities, including listening, speaking, reading and writing, also they get tested on the new material, which they

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have been explained to. Tests and exams cause stress, depression, worries , fear and uncertainty. As a result, we are talking about cultural distance, the conflict of cultures, cultural clashes and cultural barriers and failures. [2]

During the teaching of Kazakh students we can recognize a process of meeting of two cultures, the comparison of one culture, one traditional way of life with the everyday behaviour of other cultures. Standards of behaviour, adopted in one culture do not coincide with the behavioral norms of another culture, thus learning the new rules of conduct for foreign visitor is a task, comparable to language acquisition.

Cultural barriers are much harder and more unpleasant to face with than issues caused by language barrier. However, we all know from experience, that native speakers treat language mistakes with understanding. [4]

Consequently, during the course of teaching Kazakh students other barriers connected with difficulties of learning the language as a subject and other subjects in that language appear. Also, ethnic and socio-cultural barriers associated with especially ethnic consciousness, stereotypes, traditions and norms of behavior that are characteristic of a particular culture. [5] Knowledge of typology of psychological barriers in the learning process allows to identify areas of possible difficulties of students, prevent them from occurring in the various preparatory stages, pedagogical situations and make negotiations between teachers and students more effective, also to use a psychological barrier as a pedagogical means of harmonizing the development of Kazakh students in the preparatory phase of training in Russian universities.

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ASTAXANTHIN IMPACT ON PHYSICAL FATIGUE AND ANXIETY LEVEL OF WISTAR RATS

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Abstract: Astaxanthin – powerful antioxidant, which has strong positive effect on physical fatigue of adult Wistar rats.

Key words: astaxanthin, physical fatigue, anxiety level

Antioxidant properties of astaxanthin (ASTA) are significantly higher than of other carotenoids (lutein, lycopene, α- and β-carotene). This is caused by its unique structure with both hydroxyl and ketone groups on each ionone ring [1, 2]. In addition, there is data that ASTA can prevent progression of such diseases as diabetes, nervous system breaks and cardiovascular diseases and stimulate immune system and muscles weight development [3, 4]. The aim of this study was to evaluate ASTA impact in dosage 5 mg/kg of body weight on physical fatigue and anxiety level of Wistar male rats.

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Materials and methods

Experiment was conducted with 24 Wistar male rats with starting body weight 114,1±1,4 g. Exhaustive training was simulated using Treadmill LE8710R (Panlab, Spain). According to the results of first training animals were divided into two groups: control and experiment (n=10). Experiment animals during 25 days were provided with ASTA in dosage 5 mg/kg of body weight. On the 25^{th} day animals were brought to exhaustive training (session time – 20 min, speed – 25 cm/s, line degree – 20^0) [4, 5]. Anxiety level was evaluated using Elevated plus-maze at the start and final of the experiment [6]. Video recording system during 5 minutes registered amount of crossing zones of maze, percentage of entering zones and time spent there.

Results

According to results of exhaustive training experimental rats showed significant decrease ($p \leq 0.05$) in physical fatigue level in compare with control group of animals according to the following parameters: amount of shocks (4.2±0.9 and 19.7±4.4) and total shock time (0.9±0.2 s and 3.3±0.8 s). There is no significant difference in anxiety level between control and experimental animals.

It was shown that providing animals with ASTA increased their physical capability and endurance. However, there was no significant effect on animals anxiety level. This results show prospects of further ASTA research as a component of specialized food products.

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STRESS REACTION OF STUDENTS IN THE INITIAL PERIOD OF TRAINING WHEN ASSESSING THE ENVIRONMENTAL FACTORS IMPACT

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Abstract. The article presents the results of empirical research on stress reactions of students in the initial period of training when assessing the influence of environmental factors. The state of psycho-emotional sphere was studied and analyzed based on a sample of 122 first year students of environmental, engineering and philological faculties of Peoples ' Friendship University of Russia. The study showed that different levels of anxiety have different effects on the stress response and the level of adaptation processes among students. So a high level of anxiety and mental stress causes a decrease in stress resistance in training activities of freshmen. This affects the students' psycho-emotional state as well as their health and physiology.

Key words: stress, students, psycho emotional sphere

Most citizens of modern society in Russia and in the world are prone to stress that causes a state of hypertension as a result of influence of complex of environmental factors [1,2,3].The

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most unfavorable situation in the field of psychosomatic health was observed among younger students [4-5].

High and constant mental and emotional overload among students, the violation of the regime of work and rest, the imbalance and inequality of power, often lead to maladjustment, which, ultimately, may cause development of various diseases [6-8]. Among the causes of psycho-emotional tension and nervous fatigue during training in high school, you can select a set of environmental factors (educational) environment. These include high information load, exam stress, difficulties of interpersonal communication, everyday problems, anthropogenic factors, etc. [8]. In this regard, it is interest this phenomenon of students' stress is worth studying. Stress of students in learning activities is a comprehensive, integrated indicator of the individual. It includes such personality components as an adequate level of mental stress, low personal and situational anxiety, high capacity and psycho-emotional stability, adequate self-esteem and tolerance of socio-cultural environment [9,10]. Thus, the students' stress response in the initial period of training when assessing the environmental factors impact can act as an indicator of the mental health level and it is the starting point in the research of students' adaptation process.

Material and research methods**.** The study involved 122 students of 1st year environmental, engineering and philological faculties of Peoples' Friendship University of Russia. Sex and age composition of the sample studied was as follows: 52 boys (17,8+ 2.2 years) and 70 girls (17,2+1.4 years). Mental and emotional status of the investigated sample of students was determined by using a test questionnaire SAN (health, activity, mood) test and C.D. Spielberg and Y. L. Hanin. Our study was divided into 2 stages: Stage 1 - during the intercessional period on the day of practical training, in the first half of the day (from 10:50 to 12:00). Stage 2 - on the day of exams before receiving exam ticket around the same time. Student participation in the study was voluntary.

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The results of the study and their discussion. At the 1 stage of research using the test by C.D. Spielberg and Y. L. Hanin, we identified the level of personal and situational anxiety of the investigated sample of students. The results obtained allowed us to divide the sample into 3 groups depending on the level of personal anxiety (PT): high, medium and low levels of PT. The first group with a high level of anxiety is the biggest - 44,3% (n=54) of the total surveyed freshmen with average values in the group trait anxiety 50,5±0.2 points. In the second group with the average level of anxiety were included 33.6% (n=41) of students with average values in the group trait anxiety - 35,2±0.5 points. In the third group with low levels of anxiety were attributed to 22.1% (n=27) boys with averages of trait anxiety in the group and 20.6±0.5 points. With regard to the level of the reactive (situational) anxiety (RT), we observed the same pattern as that in trait anxiety. Through the study of psycho-emotional state of the sample studied according to the test SAN revealed that the students of the 1st group defined their health and mood as average, and above average activity. The 2-nd and 3-rd group of students evaluated their status according to the three-level scale as good or excellent (health - 4,9±0,5 5,6±0,5, respectively; the activity of 4.7±0.7 a 5.8±0.4, respectively; the mood - 5,2±0,2 6,2±0,6, respectively).

Discussion of the results. Studies show Y. V. Shcherbatykh [11, exam stress is one of the first places among the causes of psychophysical stress among students of the 1st course. The student's ability to resist the effects of stress largely depends on the characteristics of his personality traits such as anxiety. Anxiety is a personal trait, reflecting a decrease of threshold sensitivity to different stress factors [12]. One of the factors affecting the adaptation of freshmen to high school training is to adapt to stressful situations, where the complex acts of psycho-emotional stress, which is most destructive during the period of the examination session. The reactivity of students to exam stress depends on the stress factor, personal characteristics of students,

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and also on how quickly passes its adaptation to the context of University learning. In our study, emotional stress such as the exam has led to a significant increase in the level of reactive anxiety in the first place - the first-year students with high personal anxiety [13]. Our studies are consistent with the results of studies by Shcherbatykh Y. V. and Glebov V. V., Arakelov G. G. where they studied stress and the adaptive processes of students of different professions and ethnic groups and a comparative analysis of their susceptibility to stress at initial and final stages of professionalization.

Conclusion**.** Different levels of anxiety have different effects on the stress response and the level of adaptation processes among students. So a high level of anxiety and mental stress causes a decrease in stress resistance in training activities of freshmen. This affects the psycho-emotional, general health and the work of the functional systems of the body. The level of anxiety and emotional state of the first year students is directly related with the adequate adaptation processes. The formation of an adequate level of stress in students is key, to their mental and physical health and an important factor in ensuring the success of knowledge development and future career.

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IMPACT OF AIR POLLUTION ON THE PREVALENCE OF RESPIRATORY DISEASES IN THE CHILD POPULATION OF THE NORTHERN ADMINISTRATIVE DISTRICT OF MOSCOW

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Abstract: The article discusses the impact of air pollution on the prevalence of respiratory diseases in the child population of the Northern Administrative District of Moscow. Respiratory diseases are the most widespread pathology, especially among children. An increased incidence of children's respiratory diseases are observed within industrial zones and major highways.

Key words: air pollution, respiratory diseases, infant morbidity, prevalence of diseases, socio-hygienic monitoring.

Scientific and technological progress in the last century has caused significant changes in the environmental conditions on the planet. Humanity, as a source of global transformations, more exposed to the effects of their activities. For any harm caused to nature, it is paying their own health. Air environment has become the most disadvantaged. Atmospheric air acts as a sort of

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intermediary contamination of all other objects of nature, it contributes to the spread of large masses of pollutants over long distances. Industrial emissions, airborne, polluted the oceans, soil and water.

The quality of human health is largely dependent on the quality of its habitat. The problem of environmental pollution is most relevant in industrial centers where over 50% of Russia's population are concentrated. According to preliminary calculations, 40% of the urban population live in environmentally hazardous areas. Urban environmental problems, mainly the larger ones, are associated with excessive concentration on relatively small areas of population, transport and industrial enterprises, with the formation of man-made landscapes, far removed from the state of ecological balance.

In the modern city one feels the influence of a whole range of environmental factors, which largely determine the state of one’s health. Although the chemical elements penetrate into the body with food, water, and air, in most cases inhalation route prevails in the city. This is due to the fact that the quality of drinking water in the city stable than the composition of air and relatively uniform distribution of food for the city eliminates their effect.

Children and the elderly people have the lowest threshold of perception pollutants , but it is difficult to trace precisely the impact of environmental factors on elderly people. Therefore, the study of children's health, and more preferably of evidence, because children spend most of the time in the territory, without departing from the area of residence, have no occupational exposure to chemicals; less susceptible to bad habits and have more intensive exchange substance absorption of toxic elements proceeds more active than adults.

Children's health is an indicator of pollution and the degree of hazard of the environment due to the high reactivity. With the combination of rigidity weather with high levels of air pollution, the disease process often takes place in the form of a common

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cold or other acute respiratory diseases by type of stenosing laryngotracheitis, obstructive bronchitis, followed by chronic process and the development of asthma. According to research, air pollution in cities leads to 20 - 30% of all disease, the number of children with allergic, bronchopulmonary diseases increases [1, p.150].

Northern Administrative District of Moscow was founded in 1991 out of 6 areas: Leningradsky, rail, partly Timiryazevskiy, Frunze, Krasnopresnensky and Sverdlovsk.

Resolution of the Presidium of the Russian Federation from 03.01.91g. Number 7 "On the administrative territorial division of Moscow", defined boundaries and created 17 municipal districts, since 1997. - District 16 by entering Businovskaya area in the district of West Degunino.

The area of the Northern District of 10212 hectares, which is 10% of the total area of Moscow.

- Industrial areas - 14,500 ha (14.2%);
- Roads - 550 ha (5.4%).

Residential district territory occupies 57,100 hectares (26.4%) and is distributed into 15 administrative districts interspersed with areas of green spaces and industrial zones, which results in different configurations areas with a significant variety of road networks.

Northern District is one of the most densely populated in the city - 10.3 thousand. people per 1 sq. km., including 142 thousand. Children. 36 thousand companies, organizations and institutions were registered on the territory of the district in 2009. There are also 404 industrial enterprises.

The branch structure of the industry is represented by enterprises of almost all branches of industry: the Russian aerospace, machinery, light industry, food and jewelry industry, building materials, printing, etc.

There are 12 major industrial zones, major highways are: Leningrad, Dmitrov, Volokolamsk Highway, as well as parts of

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the October District, Riga railways.

The most significant sources of air pollution in the territory of the SAO are road transport companies, MSNPO "Bekeron" TPP-21 and highways.

The main sources of man-made pollution of the atmosphere by chemicals released to air in gaseous, liquid or solid, are industry and transport. The contribution of road transport to air pollution is steadily increasing and currently stands at 83%; followed by emissions from stationary sources (industrial enterprises) - 11%. Objects of power owns about 6% of total emissions.

It is shown that the influence of urban industrial enterprises on the part of the air can be traced for several kilometers.

Emissions from industrial enterprises are multiple and have an unstable structure. The emissions can present a variety of foreign matter in the form of solid particles (dust), gases, vapors. Air pollutants are nitrogen oxides, sulfur, carbon, phenol and aromatic hydrocarbons. Industrial dust is one of the main types of air pollution. Dusty atmosphere bad passes ultraviolet radiation, has antibacterial properties, and prevents the self-purification of the atmosphere. Dust clogs the mucous membranes of the respiratory system, is a carrier of bacteria and viruses. Soot, dust and a component of which is a substantially pure atmospheric carbon increases the incidence of lung cancer [2, p.90].

For large industrial enterprises of the Northern Administrative District of Moscow are TPP-21, TPP-28, the NGO "Bekeron" JSC, "Dux", OAO "Freedom", JSC "Meridian", OAO "Moscow mill combine" scientific association "Ivtran "and others. The industry in the district is represented mainly by the enterprises of motor transport, construction, automotive and mechanical engineering, chemical and food industries, foundries and electroplating industries, aviation industry.

Of 451 enterprises County, 258 (57.2%) of enterprises located in industrial zones, emissions which account for 94% of all recorded stationary sources. On the territory of the SAO

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within the Moscow Ring Road there are 12 industrial and 3 industrial and municipal areas. List of industrial zones of the Northern Administrative District of Moscow and data on the number of emissions of chemicals into the atmosphere, are presented in Table №1.

Table №1.

List of industrial zones and data on the number of emissions of chemicals into the atmosphere.

Name of the industrial zone	Amount of enterprises	The amount of pollutants	Emissions, t/year
Industrial zone number 46 "Korovino"	15	75	24186,4
Industrial zone number 47 "Vagonore-montnaya" Eastern Degunino	18	146	488,04
Industrial zone number 5 "Main Street"	52	92	276,97
Industrial zone number 47 "Vagonore-montnaya" - Dmitrovsky	15	64	245,67
Industrial zone number 44 "Bratsevo"	24	108	205,28
Industrial zone number 45 "Automobile Engine"	35	133	153,03
Industrial zone number 48 "Degunino-Likhobory"	35	113	134,77
Industrial area number 9 "Streets of Truth"	11	94	85,54
Industrial zone number 7 "Botkinsky fare"	6	80	82,54
Industrial Area number 8 "fork in the area"	8	47	59,52
"Left-bank -Hovrino"	16	79	49,04
Industrial zone number 12 "TAA"	9	60	36,7
Industrial zone number 13 "Koptevo"	14	61	26,65

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Due to the fact that the exhaust gases of cars come in the lower atmosphere, and the process of their scattering differs significantly from the high scattering of stationary sources, harmful substances are practically in the breathing zone of the person. The exhaust fumes from the engine contain a complex mixture of more than two hundred components, including many carcinogens. Therefore road transport should be classified as the most dangerous source of air pollution near highways.

The district placed major highways such as Leningrad, Dmitrov, Volokolamsk Highway and Korovinskoe; on the border areas "Savelovsky", "Running" and "Airport" is held the third transport ring, the intensity of the traffic, which is extremely high.

In order to prevent the adverse effects of air pollution on human health sanitary regulations "Hygienic requirements for air quality SanPin 2.1.6.1032-01 populated areas." are developed. This document established the mandatory hygienic requirements for air quality populated areas and complied with hygienic standards for the location, design, construction, reconstruction and operation of facilities as well as the development of all phases of planning documentation. Air quality is measured at populated areas hygienic standards - the maximum permissible concentration (MPC) of atmospheric pollution of chemical and biological substances. This criterion ensures that there is no direct or indirect effects on human health and the conditions of his residence.

According to the system of social and hygienic monitoring pollution levels in the district in 2008-2012., still remain high, they have steadily increased in comparison to previous years. As in previous years, the main pollutants monitored in the district are nitrogen dioxide, carbon monoxide, particulate matter, formaldehyde, benzene, phenol, ammonia, hydrocarbons of the gasoline fraction. In some periods of the locally observed in the district centers of ammonia contamination level up to 5 Macs [3, p.16].

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Detectable levels of air pollution in the Northern Administrative District of Moscow are mostly due to emissions of mobile sources - cars, which are commonly placed in residential areas, on the local area and pollute the air in the breathing zone of the person. The share of vehicles in the area accounts for about 85% - 90%, which is confirmed by the observation of the levels of air pollution on block posts, placed in the zone of influence of the highways and industrial enterprises. Results for EHM suggest permanent presence in the atmosphere of increased concentrations of hazardous chemicals and their impact on the health of the population, especially children, so the current state of air pool in Moscow is estimatedas adverse as a whole [4, p.22].

Respiratory diseases are - the most common pathology, especially among children. Out of the total incidence of children of different ages 70-84% are acute respiratory infections and chronic respiratory tract diseases: chronic bronchitis, pneumonia, bronchial asthma, which is a third of the prevalence of chronic respiratory diseases.

Increased incidence of children's respiratory diseases observed in areas in the territories which are the major highways. High levels of newly diagnosed respiratory diseases of the child population, as in previous years, continued to be recorded in the areas of: "Airport" (1762.93 per 1000 child population), "Dmitrov" (1396.04), "Eastern Degunino" (1503 96) "Savyelovskiy" (1383.22), as well as in the areas of "Khoroshevsky" (1319.27), and "left bank" (1299.71 per 1000 child population).

Irritant effect on the mucosa of the upper respiratory tract leads to the oppression of local and general non-specific protective factors, with the subsequent development of secondary immunodeficiency and oppression of interferon, a predisposition to the development of acute respiratory diseases bacterial and viral nature [5, p.13].

Man-made air pollutants are the main risk factors for the population living in the Northern Administrative District of Moscow. The remaining outstanding issues - the organization of movement of vehicles, development of systems of the main streets, the complex design study for the expansion of the internal road network neighborhoods in the urban concept of the county - tends to further increase the levels of air pollution and as a consequence of high levels of prevalence and newly diagnosed diseases respiratory diseases among child population.

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ECOLOGY AND BIOSYSTEMS

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L'AUDIT ÉCOLOGIQUE DES RÉGIONS ADMINISTRATIVES DE LA GUINÉE

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Resumé. Dans ce présent travail nous nous posons comme tâche l'estimation de la situation écologique dans les régions de la Guinée, voire la Guinée maritime (ou Basse-Guinée), la Moyenne-Guinée, la Haute-Guinée et la Guinée forestière.

Il est nécessaire de faire des investissements dans les activités de préservation de l'équilibre écologique, en coordination étroite avec les programmes du développement social et économique dans le cadre de l'effort commun des autorités administratives.

Les mots clés: La Guinée, les minéraux, la conservation et l'utilisation durable des ressources naturelles, la récultuvation des terrains

La Guinée est un des principaux acteurs de la production des minéraux en Afrique. Une demande croissante de matière entraîne l'exploitation intense des ressources naturelles, la perte des forêts tropicales, la destruction de la couche fertile de la terre

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etc. Dans les conditions du développement intense de l'industrie minière, la région de Dabola, en particulier, grand nombre des gisements des minéraux sont surexploités, s'accroissent les capacités des entreprises minières et la profondeur productive.

Il y a une tâche de compenser au fur et à mesure de l'exploitation ou dans le cadre de « l'après-mine » les terres à cultiver. La demande sociale porte sur de moindres impacts sur l'environnement et sur la santé des écosystèmes, formés pendant des millénaires, et il s'agirait donc non seulement des lieux de l'activité minière, mais de la région avoisinante [1]. C'est pourquoi pour la région de Dabola la récultuvation des terrains acquiert une importance spéciale de nos jours. Citons, par exemple, de tels objectifs de la Banque africaine de dévelopment (2011): « Améliorer la gouvernance dans le secteur extractif à travers le renforcement: (a) du cadre législatif (code minier et pétrolier) et (b) de la chaîne de contrôle à travers l'appui à la mise en œuvre de l'ITIE et au soutien de la facilité juridique africaine lors des négociations des contrats miniers » [2, p.14].

Le but de notre étude est l'élaboration des propositions sur le système des activités qui portent à la conservation et l'utilisation durable des ressources naturelles en Guinée. Il est évident qu'une gestion rationnelle des différentes ressources biologiques s'impose.

Nous nous basons sur l'expérience mondiale des études écologiques. Un de tels standards de base est le standard Britannique BS 7750. En avril 1995 l'Union Européenne a adopté le paquet des documents concernant le management et audit écologique (les standards ISO 14000) [3]. L'audit écologique définit sous beaucoup de rapports le développement de l'entreprise et la formation du marché des services écologiques.

Nous nous posons comme tâche l'estimation de la situation écologique dans les régions de la Guinée, voire la Guinée maritime (ou Basse-Guinée), la Moyenne-Guinée, la Haute-Guinée et la Guinée forestière.

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En premier lieu nous avons fait une analyse comparative de la situation écologique en Guinée du point de vue du confort de la vie dans les régions administratives ci-dessus.

L'objet de l'étude sont les systèmes éco-économiques de ces quatre régions administratives de la Guinée, l'analyse comparative de leurs caractéristiques écologiques, climatiques et économiques.

La zone forestière, par exemple, présente un système économique qui marie l'activité agricole à l'industrie minière diamantifère (essentiellement artisanale), avec la densité peu élevée de la population.

Les régions de Dabola et de Boké ont un système de management environnemental typique pour la Guinée maritime, la Moyenne-Guinée et la Haute-Guinée.

L'étude de ces régions se complique faute de données statistiques, voilà pourquoi nous avons choisi la méthode des estimations expertes [4, p. 172-175] pour évaluer la gestion environnementale et la qualité de leur exploitation économique.

Cette méthode est appliquée à tout type du management. Ces pronostiques et les estimations reflètent des jugement personnels des experts en ce qui concerne les perspectives du développement de chaque site et de chaque entité. Ils sont fondés sur toute l'expérience de vie et l'expérience professionnelle aussi bien que sur l'intuition.

Les méthodes intuitives expertes de la prévision sont utilisées pour l'analyse des objets d'études, dont l'état et l'évolution ne se plie pas partiellement ou entièrement à une description objective ou à la formalisation mathématique car les conditions de leur existance et du fonctionnement sont incertaines.

L'estimation experte est nécessaire, quand il n'y a pas de base théorique due pour l'étude du développement de l'objet, quand l'objet est trop compliqué ou encore quand le chercheur est à court de temps.

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Les méthodes individuelles sont fondés sur l'utilisation des opinions des experts qui les donnent indépendamment l'un de l'autre. Sont le plus souvent applicables la méthode de l'interview et les estimations analytiques expertes, en particulier, la méthode de Delphes [5] quand on consulte les experts sur un sujet précis.

Cette méthode suppose l'utilisation de la série des questionnaires. A la première étape nous avons défini l'objet d'étude. A la seconde étape il a fallu choisir les experts selon les critères de leur indépendance et du niveau de leur connaissance de l'objet. Puis nous avons élaboré un questionnaire avec des questions ciblées. Et après nous avons traité les réponses, posé les questions (auxquelles nous avons des amendements) aux experts et encore une fois traité les réponses.

Dans les buts de la minimisation des dépenses pour le pronostic nous avons invité le nombre minimal des experts, à condition de la garantie de l'erreur du résultat de la prévision pas plus b, où: $0<b<1$. Il est recommandé de définir le nombre minimal des experts selon la formule :

$N_{min} = 0{,}5\ (3/b + 5)$ ou $b = 3 / (N/0{,}5 - 5)$

Avec cela on doit observer la stabilisation à l'estimation moyenne de la caractéristique pronostiquée. L'insertion ou l'exception d'un expert du groupe doit ne pas changer l'estimation relative de la valeur cherchée qui doit être plus que ***b.***

La méthode décrite des estimations expertes a permis d'élaborer les questionnaires pour acquérir l'information authentique selon les caractéristiques objectives sur des systèmes éco-économiques.

Dans le panel du 1-er tour du sondage sont entrés 47 experts de professions différentes: directeurs (4 personnes), juristes (5), économistes (4), mathématiciens (5), médecins (6), chimistes (5), géologues (4), ingénieurs (5), agronomes (5), diplomates (30) 10 groupes d' experts au total.

Dans le 2-ème tour du sondage du panel il y avait 13 experts Guinéens : juristes (2), économistes (2), médecins (3), géologues (2), un agronome, ingénieurs (2), un diplomate.

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Une telle composition des panels permet d'estimer le confort de vie du point de vue d'une personne cultivée qui est un consommateur des richesses naturelles, ayant eu un diplôme d'école supérieure moderne. Cela évite le danger d'altération de cette estimation provoquée par la formation technique de la personne.

La rédaction des questionnaires se basait sur l'expérience de la Fédération de Russie. Nous nous somms servis de la classification des zones à divers risques écologiques du Ministère de l'Écologie et du Développement Durable de la France [6].

Les faits concrets de l'étude sont présentés par nous plus tôt [7].

L'estimation de l'état présent des systèmes écologico-économiques des régions administratives de la Guinée du point de vue de l'audit écologique permet de faire les conclusions suivantes.

La Guinée forestière éprouve la plus grande charge de la pollution, la coupe des bois et les incendies forrestiers. 2/3 de la population n'utilise à titre du combustible que le bois. D'après le critère de pollution les autres régions se placent comme il suit : la Moyenne-Guinée, la Guinée maritime (ou Basse-Guinée) et La Haute-Guinée. Cependant d'après le critère de la charge anthropogène la région la plus atteinte c'est la Haute-Guinée, vont après la Guinée maritime (ou Basse-Guinée), la Moyenne-Guinée, La Guinée forestière. Selon le critère des maladies de la population la région la plus malheureuse est la Haute-Guinée. Puis vont la Moyenne-Guinée, la Guinée maritime (ou Basse-Guinée). Cependant, la Haute-Guinée souffre le plus de la pénurie de l'eau potable, de la baisse de la fertilité des terres, de la disparition de la couverture végétale et de l'apauvrissement de la biodiversité animale. La Haute-Guinée, selon les experts, est la plus malsaine, elle tient la première place par les maladies humaines. La Guinée maritime (ou Basse-Guinée) est la région la plus industrialisée, a le réseau le plus développé des institutions de la santé publique. Mais les terres y perdent la couche fertile

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supérieure du sol et, bien sûr, la végétation en souffre. Des carrières de diverse grandeur et profondeur, tas de rejets, dépôts du déblai, excavation de la terre, des tranchées et des fossés, des dépôtoirs industriels et des ordures ménagères ce sont les suites néfastes du même processus de l'industrialisation.

Conclusion. La source principale des problèmes écologiques en Guinée, c'est l'absence des industries spécialisées, basées sur la production à cycle fermé, ainsi que l'utilisation peu rationnelle des ressources premières. La situation écologique révélée est caractérisée comme celle de crise: la pénurie de l'eau douce, l'état de la couverture végétale, l'apauvrissement de la biodiversité animale, la baisse de fertilité de la terre et la hausse des maladies. C'est la Guinée forestière qui est la meilleure région écologiquement parlant. Une nouvelle approche législative s'impose en Guinée. Il est nécessaire de faire des investissements dans les activités de préservation de l'équilibre écologique, en coordination étroite avec les programmes du développement social et économique dans le cadre de l'effort commun des autorités administratives.

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THE ROLE OF ZOOS IN CONSERVING BIODIVERSITY

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Abstract: Biodiversity is an integral part of our lives. Various negative factors arise due to human activities, bad influence on the environment and wildlife. Humanity needs to pay more attention to the problems of the destruction of biodiversity and to take measures to preserve rare and endangered species.

Key words: biodiversity, zoo, species, domestication

A negative impact on a variety of factors such as population explosion; pollution of water, soil and air; poaching and illegal

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trade; large-scale deforestation; the use of pesticides; seizure of land for agriculture. Along with this, there are various methods for biodiversity conservation: monitoring of intensive development of agriculture, the protection and restoration of habitats, reduce the use of toxic substances, limiting trade in species (particularly rare and endangered), the creation of protected areas, the establishment of protected areas, the establishment of sperm banks and seeds to preserve the genetic diversity, the preservation of the gene pool of rare species in zoological parks.[1]

Many zoos accumulate a lot of experience and reach new zoo-technical and technological solutions to achieve sustainable breeding of problem species. The activities of the zoos hidden a huge reserve for the recovery of rare natural forms of life; to preserve the gene pool of wild species that may be involved in ZOOCULTURE, and for use in industrial breeding methods for the direct impact on the physiological state of animals which have been developed in industrial and academic departments of the leading zoos in the country. [2] The most successful work in this direction is conducted in lower vertebrates, fishes, amphibians, reptiles; conditions have been successfully reproduced at the present time on the basis of the zoo. In zoos some researches that are devoted to the study of animal behavior in captivity are conducted. Also in zoos, there are processes of domestication of animals, especially species with a large number of generations. Latest works in the zoos related to the study of processes of synanthropization, as a result, and with the enrichment of the fauna of cities and other areas, to varying degrees, mastered by man. Zoos are the last refuge for many small groups in number of animals. In order to give the animals the necessary conditions for life and reproduction in captivity, you need an accurate understanding of species-specific features of their behavior, physiology, lifestyle, nature and knowledge of a variety of other features pet zoo. Breeding in zoos to the reintroduction - an important way to preserve endangered species. Thanks to this

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Arabian oryx (Oryx leucoryx), the California condor (Gymnogyps californianus) and many others were saved.

One of the main tasks of the zoo is to preserve rare species of animals and carry out their subsequent return to the nature. But, along with this there is a problem - it is to breed rare and endangered species of animals in captivity. To solve this problem requires a special technique, which includes tools such as artificial insemination, the use of bio-stimulants, incubation of sperm preservation. [3]

Sometimes serious difficulty is how to find pairs manufacturers, which creates a special form of sharing manufacturers for a certain period.

The Moscow Zoo is working on the reintroduction of animals, the protection of which is given relatively little attention - rare species of amphibians. Unlike amphibians, birds and mammals can be bred in captivity in large quantities sufficient for recovery of natural populations. Zoo staff has developed a universal method of hormone stimulation of amphibian spawning. [4]

However, in most cases, a separate zoo cannot contain a sufficiently large number of individuals of one species to successfully breed these animals, avoiding inbreeding. This works only with the complex efforts of many zoos, creating a rare species in captivity, a kind of artificial (or "zoo") population.

The role of the Moscow Zoo in the preservation of rare and endangered species is very important. Collection of terrestrial vertebrates in the Moscow Zoo has a high diversity of species, and this indicator is one of the richest among other Russian and even European zoos. Figure 1 presents data characterizing changes in the species composition of terrestrial vertebrate collection of the Moscow Zoo from 2004 to 2013.

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Fig.1. The dynamics of the species composition of terrestrial vertebrates collection Moscow Zoo.

The most varied collection of birds can be clearly seen from the bar chart. During the period under review at the zoo kept at least 255 species (2004) at the same time. Also of note is a gradual increase in the collection. Its maximum, 307 species, it reached in 2012. The variety of this group of vertebrates in the zoo due, firstly, with its high species diversity in the nature (of the land vertebrates is the most numerous class, numbering about 8,600 species); and, secondly, a long-established and well-developed system of detention.

The second number of species in the collection is a class of reptiles. The number of both species contained here ranges from 181 (2005 g) to 238 (2013 g). Collection of reptiles for the period under review also increased. The high rate of species diversity in this group of vertebrates is associated primarily with the achieved in the last two decades of success in their keeping and breeding and, of course, a great diversity of species of reptiles in nature (about 6400 species). Unfortunately, most of the collection is not exposed on the exposition and is located in the back of laboratory facilities.

The next collection is representative of the class of mammals. In general, the size of the collection of this group of

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the most stable, but there has been some growth from 162 (2005 g) to 179-182 species (2012-2013 g). The fact that the collection of mammals inferior to the size of the collection of birds and reptiles, primarily due to the fact that traditionally live in zoos larger species. They, of course, require larger cages and significant financial costs for maintenance.

Furthermore, it should be noted that the nature of this class has minimal diversity (about 4000 species).

Then follows the least rich collection of amphibians. The maximum size of 60 species it reached in 2011 and 2012, the minimum was in 2005 - 34 species. In the last years of the considered (2013) collection of amphibians decreased significantly, almost 1/3. A small collection of this group of vertebrates is connected not only to the fact that the number of species of this class of naturally much smaller than other terrestrial vertebrates (of about 2500 species), but probably with established tradition.

Summing up the analysis of the materials presented in Fig.1 we can say that the collection of terrestrial vertebrates of the Moscow Zoo includes a large set of all four classes of species, amphibians, reptiles, birds and mammals. The richest collection belongs to birds and the least is amphibians. Over the last decade as a whole has been an increase in species diversity of terrestrial vertebrates of all classes of the Moscow Zoo.

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ECOLOGICAL CHARACTERISTIC OF PSAMMOPHYTES (BASED ON SAND-PITS OF MOSCOW REGION)

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Abstract: In order to examine the possibilities of reconstruction of sandy slopes and stopping of sand movement ecological peculiarities of psammophytes were studied. Species diversity and distribution of life forms on different exposures of slopes in three locations are established.

Key Words: psammophyte, life form, sand-pit, sandy slope, Moscow region.

Sandy slope movement provokes destruction of ecosystems, extinction of wild animals and covering of large agricultural areas

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and pastures with sands. Sand consolidation should be performed by means of local plants [1]. This problem is very urgent and very often has an anthropogenic reason [2, 3].

Psammophyte is a plant adapted to sandy environments. It has the characteristic of being very susceptible to wind erosion, has xeromorphic structure and strongly developed root system.

The objective of the research is to examine particular ecological characteristics of psammophytes in sand-pits on different slopes. Tasks of the research are the following:

1) to examine flora diversity of sand-pits;

2) to determine major ecological and morphological characteristics of sand plants;

3) to determine the life forms of sand-pits' plants;

4) to find out which abiotic factors determine diversity and spatial distribution of sand-pits' plants.

We have visited three sand-pits in the Moscow region (Dzerzhinsky, Zvenigorod, Radumlevsky) and have examined the northern and southern slope of each sand-pit, using the geo-botanical description and studying the rhyzomes. Also life forms by K. Raunkiaer [4] and I. G. Serebryakov [5] and the rhythm of seasonal vegetation were determined.

Diversity of species in sand-pits is higher on slopes with exposure to the south (Fig. 1) compared to slopes with exposure to the north.

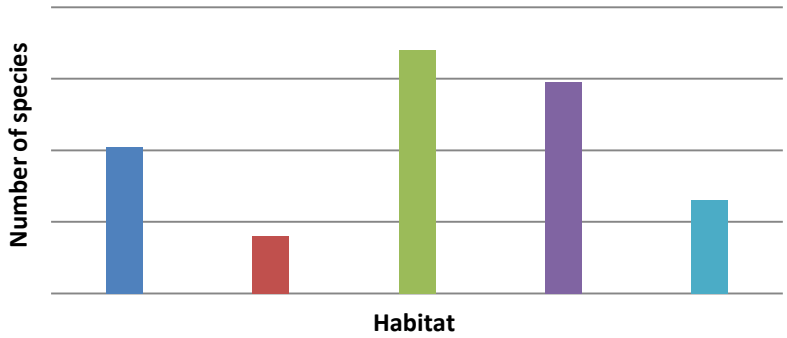

Fig. 1. Species diversity of plant in different sand-pits.

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The vegetation cover is sparse; density of cover is about 20-30%, which is common for the sandy landscapes [6]. The main factors determining species diversity are the steepness of the slopes, the richness of the soil, the lightness. The number of species is determined not only by historical patterns of development of the landscape, but also by ecological factors [7]. The important role played by the contrast of humidification [8]. Because of lack of water many species can't penetrate the southern slopes, where vegetation is quite xeromorphic [9, 10].

K. Raunkiaer suggested a system of plants classification based on the position of their bud of regeneration and found that the distribution of their main categories well corresponds with the distribution of climatic conditions. K. Raunkiaer distinguished five basic life forms: phanerophytes (Ph), chamaephytes (Ch), hemicryptophytes (H), geophytes (G), therophytes (T).

From the spectrum of life forms (Fig. 2) one can notice prevailing of hemicryptophytes on all reviewed habitats. It's generally typical for the temperate climate. Difference between exposures of slopes was not detected.

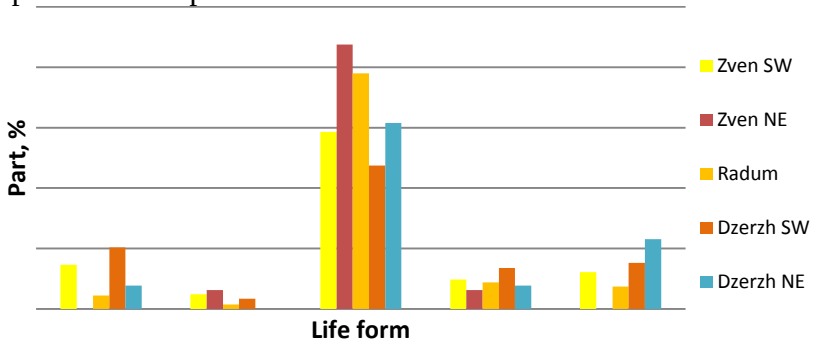

Fig.2.The spectrum of life forms according to the system of K. Raunkiaer in different habitats.

I. G. Serebryakov proposed a classification of life forms by the structure and duration of above-ground main axes' growth (trees, bushes, shrubs, herbs). Further each type is worked out in details by others characteristics.

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The spectrum of life forms according to I. G. Serebryakov characterizes completeness of using the environment [9]. It demonstrates the predominance of herbaceous long rhizome polycarpic plants, short rhizome polycarpic plants, loose cespitose polycarpic plants which generally found in Central Russia's plant communities, but the abnormal presence of tap root polycarpic plants characterizes the specificity of sandy habitats (Fig. 3).

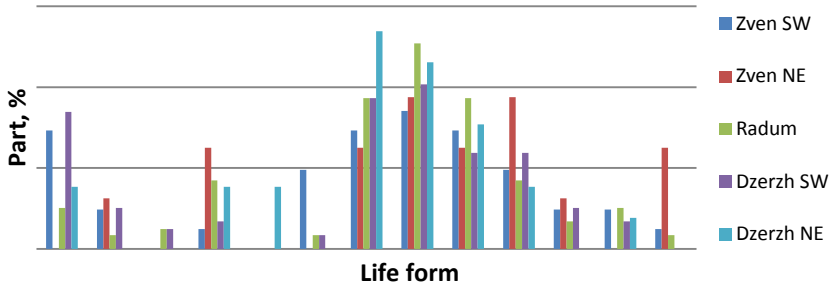

Fig.3. The spectrum of life forms by the system of I. G. Serebryakov for different habitats.

Shorthand notations: Sp – semishrub; PMp – perennial monocarpic; BMp – biennial monocarpic; Amp – annual monocarpic; TRPp – tap root polycarpic; LRPp – long rhizome polycarpic; SRPp – short rhizome polycarpic; LCPp – loose cespitose polycarpic; CPp – creeping polycarpic; RSPp – root sucker polycarpic; OSPp – overground stoloniferous polycarpic.

There are three types of seasonal vegetation: deciduous plants (D), summer-wintergreen plants (SWG), evergreen plants (EG). Due to the rhythm of seasonal vegetation deciduous plants prevail. It's also typical for temperate climate (Fig. 4). Difference between exposures of slopes was not detected.

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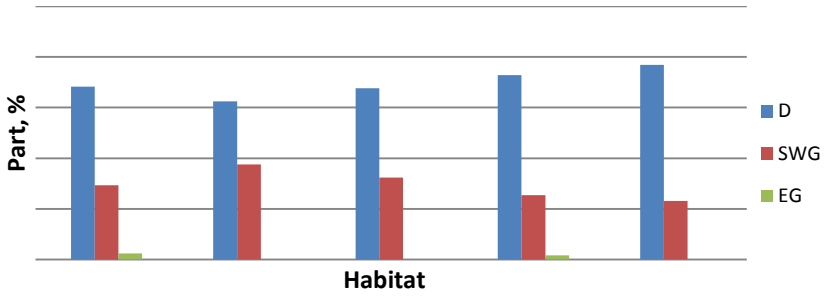

Fig.4.The distribution of plants due to the rhythm of seasonal vegetation in different habitats.

Conclusions:

1. According to the historical data and personal observations, here are plants' most important characteristics that are used in order to stop movement of sandy slopes:

a) capacity to endure or survive while being covered up with sand;

b) enhanced capability to build up adventitious roots or vegetative shoots;

c) high rates of growth after the filling up with sand;

d) diffused or deep-seated root system;

e) considerable resistance against drought and mechanical damage;

f) capability of natural reproduction;

g) ability to improve the properties of the soil.

2. Total species diversity of 119 species was noticed. It's higher on the southern slopes.

3. In the spectrum of life forms according to K. Raunkiaer hemicryptophytes prevail which corresponds to the spectrum of the temperate climate.

4. In the spectrum of life forms according to I. G. Serebryakov the tap root polycarpic plants have significant proportion which does not cohere with a typical range of plant communities in Central Russia.

5. By the rhythm of seasonal vegetation the summer-green plants group is a dominant one.

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THE USE OF SCORED SYSTEMS TO DETERMINE THE STATE PARKS OF MOSCOW

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Abstract: this text focuses on the use of score-rating evaluation system to determine the state parks of Moscow

Key words: protected natural areas (PNA), Natural-historical Park, criteria, infrastructure, biodiversity, federal low.

Specially protected natural areas (PNA) — the land, water surface and air space over them where natural complexes and objects have special environmental, scientific, cultural, aesthetic recreational and improving value which are withdrawn by decisions of public authorities fully or partly from the economic use and for which a special protection regime" [1].

At the moment there are 119 protected areas, including 10 natural-historical parks (within MKAD) [2]

"Natural-historical Park – a specially protected natural area with environmental, historical, cultural, educational and recreational value and is particularly valuable for the city and the natural complex monument of Russian history and culture" [3]

Such parks are established in natural areas, including monuments of history and culture (garden art). Natural-historical

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parks in Moscow are created with the aim of preserving natural complex and monuments of history and culture within the boundaries of specially protected natural territories. The allowed areas are used for cultural, educational and recreational purposes.[4]

The purpose of my work is to explore the natural and historical parks of Moscow. I conducted a comparative analysis of data PA according to the following criteria: the area of the Park, the number of historical monuments, infrastructure (including benches, gazebos, dustbins per unit area), outdoor activities, biodiversity (which was divided into 2 categories-flora and fauna, the number of species living in the Park was considered)

The result of these observations were ranked according to a five point system where 1 point – poor condition of a certain criterion, and 5 points – a high indicator of criterion. Moskvoretsky Park, the largest Park of Moscow is the leader (in total 19 points). Its vast territory includes the fact that flora and fauna is very diverse and includes species listed in the Red book of Moscow. This means that the Park is most suited to what it was created (namely to preserve the natural complex of monuments of history and culture) This is followed by Tsaritsyno (18), Ostankino (18) and Bitsa (18) parks. The last two are characterized by a high biodiversity: Bitsa Park has a large area, in Ostankino Park there is particularly diverse fauna. In Tsaritsyno - planned infrastructure, and there is a large number of historical monuments. An intermediate position in my classification is the Park "Pokrovskoye-Streshnevo"(17), which by many measures is the best Park, but its territory is small. Kuzminki-Lyublino (15), Sokolniki (13) and Tushino (12) parks are not the examples of symbiosis between man and nature, flora and fauna these parks are not "tanks" of natural resources. Natural-historical parks in Moscow are being created in order to save remained pieces of nature in such a big city.

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THE APPLICATION OF INDEXES OF BIODIVERSITY IN PALEOECOLOGY ON THE EXAMPLE OF THE ZAYSAN DEPRESSION

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Abstract: Application of various indexes of a biodiversity (Jacquard's coefficient, index of similarity of Syorensen,e.t.c) in palaeoecology allows to find a profuseness of specific wealth in some measure and to define similarity between various communities.

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Key words: paleoecology, Jacquard's coefficient, index of similarity of Syorensen.

Today such science as palaeoecology uses data from fossils and subfossils to reconstruct the ecosystems of the past. It involves the study of fossil organisms and their associated remains (e.g. shells, teeth, pollen, and seeds), which can be used to interpret their life cycle, living interactions, natural environment, communities, and their death. Such interpretations aid the reconstruction of past environments [1]. Therefore research of a specific biodiversity of the last geological eras is acute. Unfortunately, there are difficulties in research of this area as it is unknown, how many types occupied a certain community during a certain geological era, and what types were really characteristic of it as actually there is only limited data.

Application of various indexes of a biodiversity (Jacquard's coefficient, index of similarity of Syorensen,e.t.c) in palaeoecology allows to find a profuseness of specific wealth in some measure and to define similarity among various communities. The index of specific similarity of Syorensen was applied to research specific variety in different geological eras. This index is used for comparison of specific similarity of biocenoses, in our case of tafotsenoz (from greek táphos — a grave, burial and koinós — the general) — a congestion of the fossils (animals and plants) buried in rainfall, but few changed by processes of a mineralization) [1].

$$K = \frac{2C}{a + b}$$

where a and b – the number of the types found in each of the compared biocenoses, and c – the number of the general types. It doesn't differ from Jacquard's index.

Throughout all Cenozoic time in the territory of an intermountain Zaysan almost continuously there was the Zaysan

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lake basin considerably changing on morphometric and ecological conditions [2]. At that time the existing Zaysan lake changed in structure of a biota at a boundary of an eotsen (33,9 ± 0,1 million years ago) which was a considerable event in evolution of its ecosystem. According to lithologic and geotectonic data, on a joint of the end of a Palaeocene and the beginning of the lower eocene in the territory of the studied depression there were tectonic movements which led to a raising of areas of demolition and strengthening erosive processes, and in that time there passed some humidization of climate.

The Eocene landscape surrounding the lake was a savanna. The theriofauna of the lake was dominated by representatives of archaic tapirs, *Veragromovia desmatotheroides*, kondilyators, pantodonts, *dinocerata Uintatheriidae*, tapir *Isectolophus, Helaletes*. Open and half-open spaces were inhabited by turtles *Hadrianus obailiensis, Ergilemys insolitus saikanensis, Protestudo darewskii, P.illiberalis* [2]. According to paleobotanical data, the climate is characterized as hot, tropical or a subtropical and warm-temperate, not too arid, but seasonally dry.

In the Eocene in the territory of the lake there were mostly representatives of tropical flora.

To calculate, the published data was used, sponsored by V.S Yerofeyeev and I.A. Ilyinskaya. The Paleogene basin in Zaysan provides 4 suites on Table V.S. Yerofeyev: *north - Zaisan* Formation (Upper Cretaceous - Paleocene) *turanginskaya* Formation (Lower - Middle Eocene), *tuzkabakskaya* Formation (Upper Eocene - Lower Oligocene) *ashutasskaya* Formation (Middle and Upper Oligocene).

Syorensen index of similarity between the floras of *the north - Zaisan* and *turanginskoy* suites is 0.1%. The total number of species - 92, the number of the same species is 5.

Syorensen index of similarity between the floras of *turanginskoy* and *tuzkabakskoy* suites is equal to 0.3%. The total number of species - 96, the number of the same species is 13.

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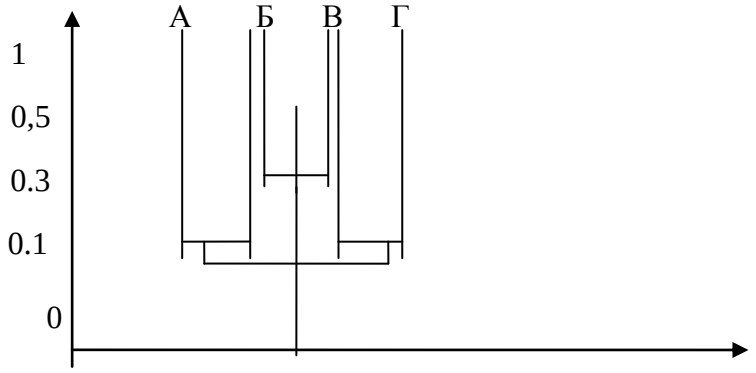
Syorensen index of similarity between the floras of *tuzkabakskoy* and *ashutasskoy* suites is 0.1%. The total number of species - 130, the number of the same species is 7.

For a graphical analysis of the similarity of samples Terentyev Pleiades were used. This type of graph, unlike dendrite considers all similarity matrix. Terentyev pleiades also can be constructed using faunal similarity matrix calculated based on Jaccard similarity index [4].



Picture 1. Terentyev pleiades

This type of graph is an undirected graph. All its objects can be connected by lines, reflecting a measure of similarity and connecting objects. The thickness or the nature of the lines corresponds to a certain range of similarity index [4].

The exhaust from the points of parallel lines are connected to the segment at the value of the similarities and combined into a single cluster. Then there is the second largest index of similarity. If it connects the two other not yet united in a group objects, then they are connected in the same manner as the first two, but separate from, the appropriate level of similarity. In our example, the second strongest relationship exists between objects and AB SH (0.1), with one of these sites has already integrated into the cluster. [4].

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It should be noted that the results are imprecise and require further adjustment. The study of biological diversity paleoecosystems requires their measurement, and the measurement is made possible only when the qualitative features can be described quantitatively in terms that can be compared [4].

Especially rewarding is the method of comparative analysis of the fauna, flora, ecological communities. This analysis must first reach the organisms that existed simultaneously, but lived in different conditions; but it is also necessary to conduct a comparison with biocenoses, individual forms and whole fauna and flora of various geological ages, including the modern era.

Zaysan valley is of great interest for further analysis of species diversity paleoecosystems. Characteristically, the end of the Cretaceous period to the present time, the overall plan orographic environment Zaysan depression is substantially changed, the main watershed basin is prone vast hills that existed on the territory of the Altai and the Mongolian Altai. [5]

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ZOOPLANKTON COMMUNITY STRUCTURE IN THE PELAGIC AND LITTORAL ZONES OF THE OVERGROWN LAKE BELOE (VOLZHSKO-KAMSKIY BIOSPHERE NATURAL STATE RESERVE, RUSSIA)

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Abstract: Comparative analysis of the zooplanktonic community was performed in the pelagic and littoral zones of overgrown Lake Beloe (Volzhsko-Kamskiy Biosphere Natural State Reserve, Republic of Tatarstan, Russain Federation). We detected a remarkable diversity of both pelagic and sublittoral plankton. The planktonic community of the macrophyte zone differs from the community of pelagic zone in a species composition and in larger species diversity.

Key words: zooplankton, planktonic community, abundance, biomass, macrophytes

Introduction

The littoral zone of a lake is known to be an area with a specific complex of conditions that influences the entire lake ecosystem [1]. Macrophytes are an important component in regulating the biological structure of a lake. Macrophytes influence organism distribution in a lake, light transmission, temperature and pH [2].

Macrophyte occurrence in a lake and degree of its overgrowth show trophic conditions of a lake [3]. Complex relations between planktonic organisms and between planktonic

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organisms and macrophytes are a subject matter and a basis for making hypothesis and theories for different scientists [4].

Usually, sublittoral planktonic community in the macrophyte zone differs from that in the pelagic zone of a water body and consists of truly planktonic as well as of the periphytic and benthonic species [5]. Macrophytes form a community habitat and establish development peculiarities of all groups of planktonic community (particularly, protozoo-, zoo- and phytoplankton) in a littoral zone of a lake with macrovegetation [6]. The problem of planktonic organisms development in macrovegetation is not limited to clearing up differences in biodiversity indicators in various biotopes for diverse planktonic components, but it also involves a study of interaction between macrovegetation and planktonic community as a whole. The interaction is reflected by a competition, by displacing a competitor in space, light interception (shading) or nutrient interception (intensive absorption), by allelopathic influence [5], by interspecific competition of zooplankton in macrovegetation, by influence of invertebrate predators inter-connected with macrovegetation on zooplankton. Besides, this interaction affects structural and productional indicators of the whole planktonic community.

The first stage in research of any problem (particularly, revealing of interaction mechanism) consists of data accumulation. In this instance, phyto-, protozoo- and zooplankton are researched in various ecotopes diverse in mineralization, chemical structure, the extent of overgrowth and morphometry of various lakes. This work represents the results of the first planktonic community research in macrovegetation of Lake Beloe. The study is intended to identify peculiarities of planktonic community development (as a whole and its separate components), comparing a pelagic part of basin with a littoral one and associations formed by particular macrovegetation species.

Materials and methods

Lake Beloe (55º55'26.2"N, 48º45'49.9"E) is located in a

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protected zone of the Raifskiy area of Volzhsko-Kamskiy State Natural Biospheric reserve, Republic of Tatarstan, Russian Federation. It is located in a hydrosystem of the rivers Sumka and Ser-Bulak, located in a karst-suffosion valley.

Lake Beloe is a water body of karst-suffosion origin, overgrown (30% of its area is occupied by macrophytes located along the coastal zone). Water retention time in the lake is high, its maximum depth of 4 m, which is found in the south-eastern part of the lake**.** The lake length is about 557 m and its width is about 170 m. At the sampling time, the lake was thermally stratified with a thermocline at the depth of 2-3 m. Water transparency was up to 1.4 m and water colour value was low (80°Pt).

Lake water has medium level of mineralization and belongs to calcium-hydrocarbonate type. In 2006, a surface layer was oxygen saturated (up to 168%), while we revealed a saturation deficit (8.7%) at the bottom. The following macrophytes are located in the 10 m width littoral zone: *Typha latifolia* L., *Zizania latifolia* Stapf. and *Sagittaria sagittifolia* L. A shallow part of the lake, with a depth of less than 1 m, is covered by *Ceratophyllum demersum* L., *Elodea canadensis* Michx., *Potamogeton angustifolius* J.Presl and *Nuphar lutea* L.

Our study of the zooplankton community was conducted in July of 2006 in six different biotopes: a) a water column in the pelagic part, and b) in a macrovegetation, belonging to different ecological types [7]: helophyte tall grass (*Z. latifolia*) and helophyte low-grass (*S. sagittifolia*), submerged rooted hydrophytes (*C. demersum* and *P. angustifolius*) and rooted hydrophytes with floating leaves (*N. lutea*).

Samples were collected with Ruttner bathometer (4 L). In macrophyte beds water was sampled from a surface layer (0.1-0.3 m). In the pelagic zone samples for zooplankton analyses were taken from a surface layer (0.1-0.3 m) and from the whole water column (0-4 m), respectively.

For zooplankton analysis we concentrated 5 L of water by

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filtering it through Apstein net of 64 μm mesh size. Zooplankton samples were fixed with 4% formalin and counted in the Bogorov chamber. Abundance (ind./L) and biomass (mg/m³) were calculated for each species in each sample. The tables of standart weights of organisms [8] and our measurements were used to calculate the biomass. The guide books of were used for identification of the zooplankters.

In zooplankton community we considered as dominant species those with abundance and biomass not less than 10% of a total abundance and biomass

Species diversity was evaluated using Shannon index. Pielou index was used for confirmation of species community equitability on abundance. Similarity of the planktonic communities in different ecotopes was calculated with Sørensen's similarity coefficient. Stand Density Index (SDI) was calculated for each species in community. SDI is the criteria, connecting average biomass (*B*) and the abundance of individuals (*N*), characterizing species inside of biocoenosis:

$$SDI = \sqrt{NB}$$

To study the variations of plankton community, a principal component analysis (PCA) was conducted. It is a factor method of statistical analysis, and a linear and multidimensional part of descriptive statistics. It can synthesize, describe and classify data from one table to provide a summary. A PCA was made for the total community on the basis of Stand Density Index.

Cluster analysis was made using Sørensen's similarity coefficient for planktonic communities in different ecotopes. Clustering of data was made by Ward method, euclidean distance was used as grouping parameter.

Statistical analysis (data clusterization and factor analysis) of the results was made using Statistica 6.0 software.

Results and discussion

In 2006 in all biotopes we found 84 species of zooplankton (taking into account zooplankton inhabiting the whole water

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column of the pelagic zone). Among them, 18 % of zooplankton species were unique for pelagic zone and 60 % of zooplankton species were unique for the macrophyte zone. Similarities between pelagic and macrophyte zones were 35 % for zooplankton community. Sorensen's coefficients indicated low similarity between plankton inhabiting pelagic zone and communities of different sublittoral ecotopes (45-57 % – for zooplankton). From the other side, similarity between plankton communities inhabiting different macrophyte species beds was high (44-50 % – for zooplankton). Cluster analysis indicated the peculiarity of pelagic plankton; and the community from *Nuphar* was the closest to the pelagic one among the sublitoral ecotopes (Fig. 1).

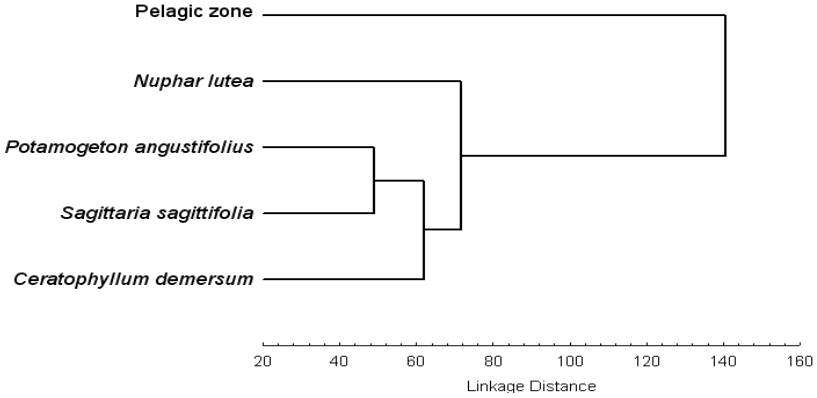

Fig. 1. Cluster analysis on similarity of the zooplankton communities in Lake Beloe.

Species diversity of zooplankton (Shannon index based on abundance Hn = 4.59; Pielou index E = 0.84) community was higher in the zone of submerged rooted macrophytes (*Ceratophyllum* and *Potamogeton*). Shannon index was high due to a high number of species and a relatively low number of dominant species (or even their absence) (Table 1). In zooplankton community from *C. demersum*, 94 % of total abundance was presented by subdominants, while dominants were absent.

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Table 1. Comparison of plankton in different zones of Lake Beloe in July 2006.

Parameter	Biotope					
	Pelagial, surface layer (0.3 m)	Nuphar lutea	Potamogeton angustifolius	Ceratophyllum demersum	Sagittaria sagittifolia	Zizania latifolia
Number of species	9	22	n.f.	44	24	37
Shannon index, H(N)/H(B)	2.8/2.13	3.0/2.56	n.f.	4.59/3.86	4.17/3.26	4.18/3.01
Pielou index	0.62	0.67	n.f.	0.84	0.91	0.80
Abundance, ind./L	108.6	266.8	n.f.	469.2	702	651.8
Biomass, mg/m3	894.3	1583.8	n.f.	3218.2	20745.4	11324.9

n.f. - not found; $H_{(N)}$ - Shannon index calculated based on abundance, $H_{(B)}$ - based on biomass

Maximum total abundance (4.85 x 106 ind./L) and biomass (21.89 mg/L) for zooplankton (from macrophyte association of three different ecotypes: *N. lutea*, *C. demersum* and *S. sagittifolia*) were registered for the zone of *S. sagittifolia.* Maximum total number of species (118 species) was registered for planktonic community in *C. demersum*. Maximum numbers of plankton species were registered in submerged rooted hydrophytes zone (Table 1). High abundance and biomass of plankton in submerged rooted plants communities was noticed previously [3,7]. It is explained by (1) presence of a suspended organic matter and fine detritus, (2) better protection from waves and wind, (3) diversity of local niches etc. Maximum value of

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zooplankton abundance in *S. sagittifolia* was caused by a great number of nauplii there. Minimum number of species (81), total abundance (1.95 x 106 ind./L) and total biomass (3.47 mg/L) were registered in *N. lutea* zone. It's interesting that species inhabiting this zone were similar to those in pelagic zone, because the *N. lutea* forms the most "pelagic" zone of macrophytes. As it is also known, this plant extracts the alkaloid nupharin, depressing the development of cyanophyta [5]. Furthermore, broad leaves of *N. lutea* reduce the light penetration to the water column and due to this unfavorable for the phytoplankton. Lack of available food decreases number of protozoan (ciliates) and metazoan plankton species.

Another peculiarity of the plankton of Lake Beloe in 2006 was a relatively high number of Rotifera in pelagic zooplankton (44 %) comparing with littoral community (11-24 %). Our results are in a good agreement with those by [9], who also found high abundance of Rotifera in the pelagic zone of Lake Beloe. As Rotiferia prefer more eutrophic conditions, we can propose that in the littoral zone macrophytes adsorb the organic particles from the water, but there is a lot of fine detritus on the leaves surface. It could be regarded as explanation of high number of the sessile rotifers *Rotaria neptunia* (Ehrenberg, 1832), *R. rotatoria* (Pallas, 1766), *Dissotrocha aculeata* (Ehrenberg, 1832) and scrapping crustaceans (*Pleuroxus truncatus* (O.F. Muller, 1785), *P. aduncus* (Jurine, 1820), *Chydorus sphaericus* (O.F. Muller, 1785), *C. ovalis* Kurz, 1875, *Alona intermedia* Sars, 1862, *A. rectangula* Sars, 1861) occasionally present in plankton samples. These species generally are filterers. They were washed out from the floating leaves of *Nuphar lutea* and gave about 94 % of "plankton" abundance. In zooplankton inhabiting other macrophytes (*Typha latifolia, Zizania latifolia, Sagittaria sagittifolia, Ceratophyllum demersum, Elodea Canadensis* and *Potamogeton angustifolius*) and in the pelagic zooplankton the percentage of filterers was lower (68-80 % of total abundance) and the role of predators (*Mesocyclops leuckarti* (Claus, 1857),

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Thermocyclops oithonoides (Sars G.O., 1862), *Eucyclops macruroides* (Lilljeborg, 1901), *Microcyclops varicans* (Sars G.O., 1863)) was more considerable. Some authors [5] observed similar distribution of filterers and predators in zooplankton community.

As a result of PCA analysis based on stand density index for all three groups of plankton from macrophyte association of three various zones (*N. lutea*, *C. demersum* and *S. sagittifolia*), we selected 2 groups which included species from zooplankton, corresponding to the first two principal components (Table 2). The selected two principal components describe more than 80 % of variability of structure of community. Probable, grouping factors for PCA axis were trophical preferences of protozooplankton and zooplankton depending on size.

Table 2: Result of the Principal Components Analysis (PCA) for zooplanktonic species, their interset correlation coefficients (r) with PCA axes, eigenvalue and the percentage of variance explained by the first two components for planktonic community in the Lake Beloe in July 2006. Only species with $|r| > 0.9$ are presented.

Species	Abbre-viation	PCA Axis 1	PCA Axis 2
Asplanchna priodonta Gosse	zApr	-0.178	**0.984**
Alona rectangula Sars	zAre	**0.941**	-0.338
Alona intermedia Sars	zAin	-0.263	**-0.965**
Ceriodaphnia pulchella Sars	zCpu	**0.991**	-0.131
Ceriodaphnia reticulata (Jurine)	zCre	**-0.999**	-0.044
Daphnia cucullata Sars	zDcu	-0.178	**0.984**
Eucyclops macruroides (Lilljeborg)	zEma	-0.178	**0.984**
Mesocyclops leuckarti (Claus)	zMle	0.284	**0.959**
Microcyclops gracilis	zMgr	**0.941**	-0.338

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(Lilljeborg)			
Sida crystallina (Müller)	zScr	0.117	**0.993**
Eigenvalue		3.16	1.27
Variance explained, %		61.57	24.75

The first principal component (61.57 % of variance explained of structure of community) contained small copepods: *Metacyclops gracilis gracilis* (Lilljeborg, 1853) and cladocerans: *Ceriodaphnia reticulate* (Jurine, 1820), *C. pulchella* Sars, 1862, *Alona rectangula* Sars, 1862 (Fig. 2).

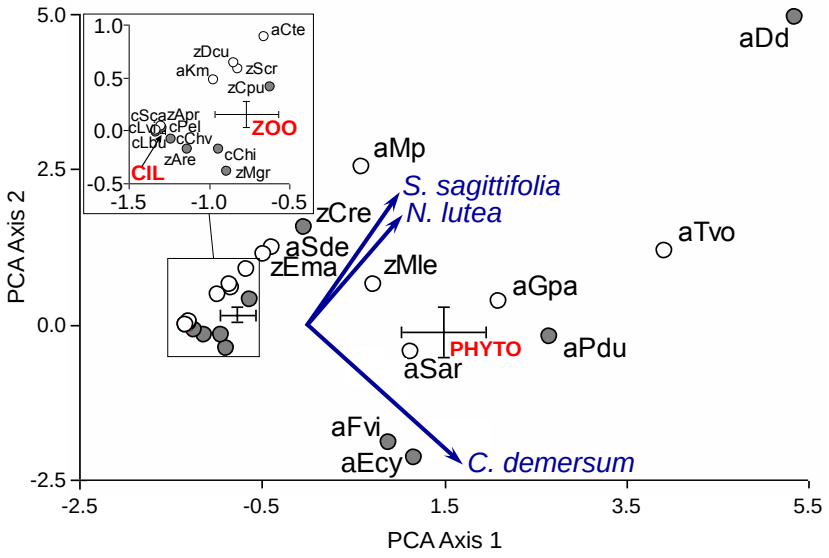

Fig. 2. Principal component analysis biplot of ordination between planktonic community and different biotopes of Lake Beloe in July 2006. Plot of centroids (mean) of clouds distributions of the plankton community and some plankton species (species abbreviations are given in Table 2) in the space of the first and second PCA axis; ± 95% confidence interval. Grey circles - species most correlated ($|r| > 0.9$) with the first principal component, open circles - with the second principal component.

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PHYTO – phytoplankton, CIL – protozooplankton, ZOO – zooplankton.

The second principal component (24.75 % of variance explained of structure of community) included: *Asplanchna priodonta* Gosse, 1850, *Sida crystallina crystallina* (O.F. Muller, 1776), *Daphnia cucullata* Sars, 1862, *Eucyclops macrurus* (Sars G.O., 1963), *Mesocyclops leuckarti* (Claus, 1857).

Our study has demonstrated that plankton of macophyte zone is characterized by a high species diversity and peculiarity of all groups as compared with pelagic zone of Lake Beloe.

Maximum total abundance and biomass of plankton were registered in the zone of *S. sagittifolia*, maximum number of species was registered in the zone of *C. demersum*. However maximums of zooplankton groups were registered in zone of low-grasses helophytes (*S. sagittifolia*). Minimum abundance, biomass and Shannon index is registered in the zone of plants with floating leaves (*N. lutea*) because of inhibition by nupharin, shadowing and closeness to pelagic zone.

We have not found any strong differences in the species composition of zoo- plankton between littoral zones covered by different macrophytes. However there were differences between the pelagic and littoral plankton: higher percentage of rotifers in pelagic zone as compared with littoral zooplankton.

The peculiarity of our study is finding specific character of planktonic community organisms in phytal zone of Lake Beloe, its comparing with pelagic complex of organisms and determining of its contributing factors.

Conclusion

Phytophilous fauna play a significant role in species diversity development in planktonic community of the lake, and communities of planktonic organisms forming in various ecotopes are characterized by high species diversity. Differences in components of planktonic community developing in the pelagic part of the lake and in individual macrophyte species are

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more significant than differences between macrovegetation plankton communities. Reaction of zooplankton community to conditions in different ecotopes is similar in spite of peculiar properties of their biology and organization.

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REPTILE SPECIES DIVERSITY IN SEMIDESERTS AND DESERTS OF THE ASTRAKHAN REGION

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Abstract: A long term field research in reptile species diversity of Astrakhan deserts and semideserts has revealed a list of 14 species which form six main communities corresponding to different localities.

Key words: reptiles' communities, species diversity, population density, desert, semidesert.

Our long term research in reptile species diversity of Astrakhan deserts and semideserts has revealed a list of 14 species [2]. On the whole they form six distinguished reptile communities corresponding to these localities [1, 3]. They are:

The first locality lies near the Volga - Ahtuba river valley. The natural biotope is overgrown sandy hillocks. The local reptile community consists of four species: *Eremias arguta deserti, Phrynocephalus guttatus guttatus, Vipera ursini renardiand, Elaphe dione.*

The reptile population density is about 49 animals per hectare (ha).

The second locality is situated in the central part of the Astrakhan sandy desert. The natural biotope, in general, is the same overgrown sandy hillocks, but the reptile community is much poorer and consists of only 2 species: *Eremias arguta deserti and Phrynocephalus guttatus guttatus.*

At the same time the reptile population density is higher and is about 60 animals per hectare.

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The third locality lies in the Harabaly District. The natural biotope is formed by overgrown ridges and sandy hillocks with bushes. The local reptile community consists of four species: *Eremias arguta deserti, Eremias velox velox, Phrynocephalus guttatus guttatus and Elaphe dione.*

The reptile population density is relatively lower – only 39.4 animals per hectare.

The forth locality is situated in the south-eastern part of the Volga-Ural sandy deserts. The natural biotope is formed by sandy hillocks with poor vegetation. The local reptile community consists of four species: *Eremias arguta deserti, Phrynocephalus mystaceus mystaceus, Phrynocephalus guttatus guttatus and Eryx miliaris.*

The reptile population density is the lowest – 28.2 animals per hectare.

The fifth locality lies in the northern part of a sandy-loamy semidesert with salt-marshes and rare sandy hillocks. The local reptile community consists of five species: *Eremias arguta deserti, Eremias velox velox, Phrynocephalus guttatus guttatus, Phynocephalus mystaceus mystaceus and Phrynocephalus helioscopus helioscopus.*

The reptile population density is one of the highest – 64.9 animals per hectare.

The last, sixth, locality lies in the center of the Harabaly District. The natural biotope is the isolated sandy massif Berly, it consists of sandy hillock ridges and salt-mashes. The local reptile community has the highest species diversity and consists of seven species: *Eremias arguta deserti, Eremias velox velox, Lacerta agilis exiqua, Phrynocephalus guttatus guttatus, Phrynocephalus mystaceus mystaceus, Vipera ursini renardi and Elaphe dione.*

The highest species diversity forms the highest reptiles population density – 66.1 animals per hectare (ha).

Thus, the reptile community with the highest species diversity and the highest population density lives on the isolated sandy massif Berly [1, 4]. So, we proposed to establish a

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herpetological reserve on this territory and some years later it was done.

Deserts and semideserts of the Astrakhan Region are of high herpetological value for this country [5]. Our research did not cover all of these ecosystems. All of them need special investigations and reptile population monitoring.

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THE ROLE OF PESTICIDES PARAQUAT AND ROTENONE IN THE ACTIVATION OF NEURODEGENERATIVE PROCESSS INTRODUCTION

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Abstract: Pesticides paraquat and rotenone have been suggested to provoke oxidative stress to the neuronal tissues in human brain. We have investigated the higher production of reactive oxygen species (ROS), the markers of oxidative stress after the treatment with the paraquat (1mM) and rotenone (20 μM) pesticides using the method of optical imaging. Another index of the imbalance between the production of ROS and the ability to detoxication of the reactive intermediates is the lipid peroxidation end product, malondialdehyde (MDA). Paraquat and rotenone have increased the MDA level in dose-dependent manner after 24 hours of incubation. These results suggest that the application of pesticides on the human neuroblastoma SH-SY5Y cell culture leads to the activation of oxidative stress process and

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cell death which are the key mechanisms of the most common neurodegenerative diseases.

Key words: pesticides, paraquat, rotenone, neurodegenerative process, oxidative stress

Pesticides are chemical agents used to control pests and plant diseases as well as various parasitic weeds. Most of the pesticides are toxins poisoning the target organisms [1]. Pesticides belong to inhibitors of enzymes (biological catalysts). Under the effect of pesticides biological reactions cease to flow and it allows destroying weeds, insects and vermin [2].

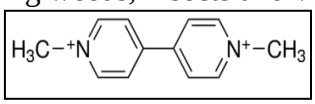

Figure 1.Paraquat ($C_{12}H_{14}Cl_2N_2$)

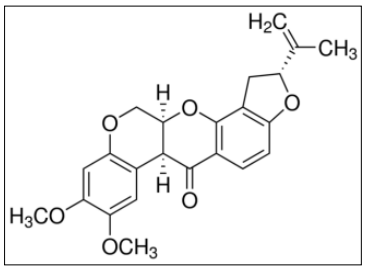

Figure 2. Rotenone ($C_{23}H_{22}O_6$)

Pesticides paraquat (Fig.1) and rotenone (Fig.2) are widely used in more than 130 countries [3]. Paraquat is a herbicide, that acts by inhibiting photosynthesis [4]. Rotenone is used as a pesticide, insecticide, and as a nonselective piscicide [5]. Rotenone is not highly toxic to humans, mammals and birds but toxic to fish [6].

Paraquat and ronenone inhibit complex I of the mitochondrial respiratory chain and increase oxidative stress (OS) [7]. Excessive ROS can damage all macromolecules,

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including lipids, proteins and nucleic acids leading to an overall progressive decline in physiological functions [8].

Pesticides are involved in the transfer of the mitochondrial electron in the transport chain. As a result of the impossibility of transmitting the electron from complex I to coenzyme Q (Co Q), there is a forming of backup electrons within the mitochondrial matrix. The cell oxygen becomes an active form, creating free radicals, which can cause damage to the mitochondria [9].

The human brain is particularly susceptible to oxidative damage. Most mechanisms of neurodegenerative disorders are mitochondrial disfunction, complex I inhibition and oxidative stress provoked by genetic predisposition and environmental factors [10].

Therefore, paraquat and rotenone induced the neuronal death. In this connection they are widely used in the modelling of neurodegenerative diseases in vitro and in vivo [11, 12].

Despite the fact that the relations between the pesticides and the onset of neurodegenerative processes is confirmed, the mechanism of the effect of rotenone and paraquat on the neurodegenerative processes is not fully clear [13].

In this paper, we aimed to assess the toxicity of pesticides paraquat and rotenone on the human neuroblastoma SH-SY5Y cell culture.

Materials and methods

Cultivation of cells

Human neuroblastoma SH-SY5Y cells (ATCC, USA) were cultured in Eagle's minimal essential medium with glutamine (PanEco, Russia) and F12 medium without glutamine (PanEco, Russia) in the 1:1 ratio, containing 10% fetal bovine serum (PAA Laboratories, USA) and 1% antibiotic solution of penicillin and streptomycin (PanEco, Russia) at 37°C, 5% CO_2 and 90% humidified. Cell differentiation in neuron-like type was triggered by lowering the FBS in medium to 1% with the addition of 10 μM of retinoic acid (Sigma, USA) during 7 days and 75 nM

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phorbol ester 2-O-tetradecanoylphorbol-13-acetate (Sigma, USA) during 3 days after plating [14].

MTT assay

The dose-dependent effect of pesticides neurotoxicity was determined by the MTT assay.

The cells were seeded into 96-well plates at a density of $3 \cdot 10^3$ cells per well and differentiated. Next toxins paraquat (0,25 – 5 mM) and rotenone (0,1 – 200 μM) were added in 8 wells per group. The incubation time was 24 hours.

After MTT reagent – 3-(4,5-dimetylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (Dia-M, Russia) prepared using the culture medium at the final concentration of 0,5 mg/ml - was added. After 3 hours of incubation the medium was removed from the wells. In each well dried formazan residue was reconstituted in 100 ml dimethyl sulfoxide. The absorbance of solution in the wells was measured at λ = 570 nm on spectrophotometer Synergy H4 Microplate Reader (BioTek, USA). The data are presented as percentage of the absorbance value of the control solution in the control wells, which was taken for 100% [15]. The processing of the results was performed using Microsoft Excel software.

Measurement of Reactive Oxygen Species

The process of intracellular ROS formation was determined by fluorescent microscopy optical imaging using microscope NiconTS-100 (Japan).The fluorescent 2′,7′-dichlorofluorescein diacetate ($DCFH_2$-DA) 100 μM (Sigma, USA) was added to the cell dishes and incubated for 20 minutes. $DCFH_2$ -DA enters the cells, where it is cleaved to form nonfluorescent 2′,7′-dichlorofluorescein (DCFH) by endogenous esterases. DCFH reacts with reactive oxygen species producing fluorescent compound 2′,7′ dichlorofluorescein (DCF), which indicates the intracellular ROS level [16]. After the incubation, cells were rinsed out with 1 ml Locke-Ringer solution 6 times. Then the pesticide paraquat (1 mM) or rotenone (20 μM) was added. The registration of DCF fluorescence intensity was determined in

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particular cells by photo imaging every minute within 10 minutes. The results of the average values of the individual cells fluorescent intensity were performed using NIS- Elements D (Laboratory Imaging) and Microsoft Excel software [17].

Measurement of malondialdehyde (MDA)

Cells were seeded in culture dishes (60 ×15 mm) at a density of 5·106 cells and differentiated.

Malondialdehyde (MDA) is one of the lipid peroxidation end products, was measured by the thiobarbituric acid (TBA) test. Cells were treated with paraquat (0.5; 1.0; 1.5 mM) or rotenone (0,001; 0,025; 0,05; 0,075; 0,1 mM) for 24 hours. After the treatment, cells were harvested, centrifuged at 1000 g by 10 min, and resuspended in 500 µl of Hanks solution (PanEco, Russia). Cells were lysed by the freeze/thaw for 2 times at -80^{0}C. Cell homogenates were mixed with 2,5 ml 20% trichloroacetic acid (TCA) and 1 ml 0.67% TBA, then boiled at 100°C for 30 min and cooled on ice. Butanol-1 (4 ml) was added to each sample and centrifuged for 15 min at 3000 g. MDA levels were determined at 532 nm using spectrophotometer Ultrospec 3300 (Amersham Biosciences, UK) [18].

MDA concentration (Cx) was calculated using the formula:

$Cx=\frac{10*D}{1,56*10^5}$ (nmol/l).

D – Density (M -1·cm-1)

Statistical analysis

All data are presented as mean ± standard errors of the mean (M±m). The data were processed using Statistica 7.0 software and Microsoft Excel. To determine the level of significance of the differences, a Student T-test was applied. A value of $p<0,05$ was considered to be significant.

Results

1. MTT assay determined the dependence of the cell viability on the applied concentration of rotenone and paraquat. Approximately 50% of viable cells were detected after the addition of 20 µM of rotenone and 1 mM of paraquat (Fig. 3, 4).

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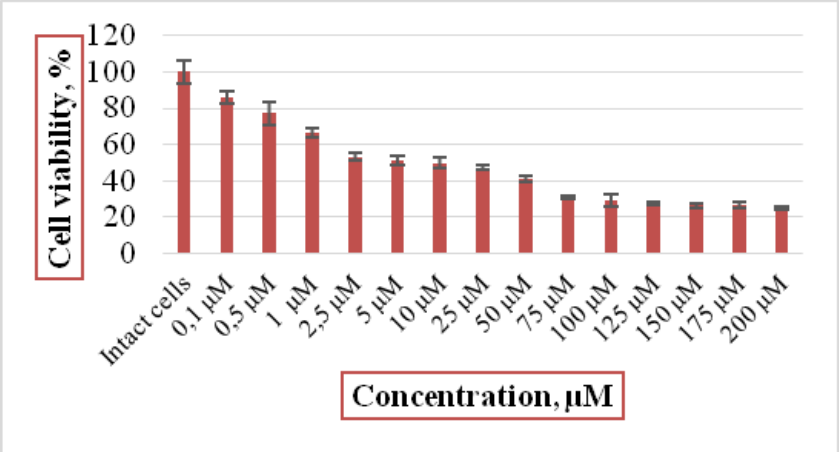

Figure 3. Dose-dependent effect of rotenone toxicity on differentiated human neuroblastoma SH-SY5Y cells

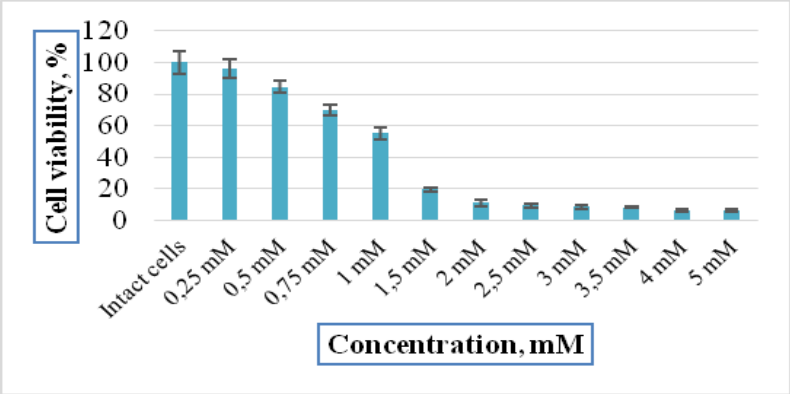

Figure 4. Dose-dependent effect of paraquat toxicity on differentiated human neuroblastoma SH-SY5Y cells.

2. The amount of the intracellular ROS over time was determined by the method of optical imaging. Studies showed that fluorescence intensity increases rapidly within 5 minutes after the addition of rotenone and 8 minutes after the addition of paraquat. The paraquat (1 mM) had an intensity value of 50 c.u., whereas rotenone (20 μM) had an intensity of 90 c.u. (Fig.5) after 10 min incubation.

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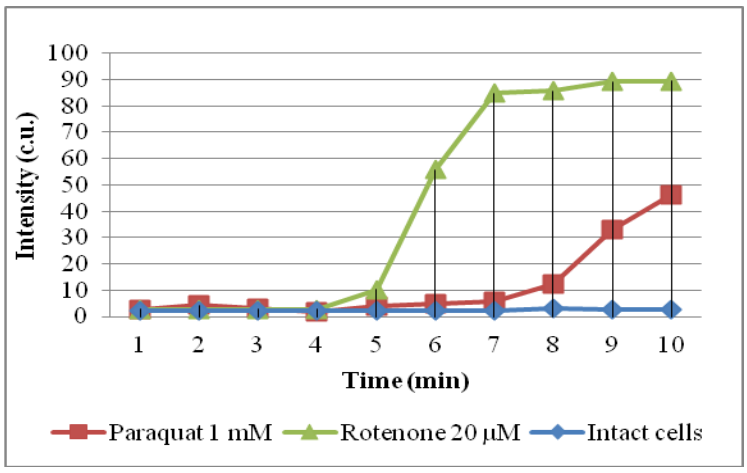

Figure 5. The fluorescence intensity of DCF (c.u.) after adding paraquat (1 mM) and rotenone (20µM).

3. The obtained results of measuring MDA concentration in cell suspension after the treatment with pesticides rotenone and paraquat for 24 hours are presented in Table 1. The rate of increase in optical density was used as an indicator of oxidative stress.

Table 1. The content of MDA (nM/l) in SH-SY5Y cells after the treatment with pesticides rotenone and paraquat in different concentrations for 24 hours.

	Concentration (mM)	**MDA concentration (nM / l)**
Intact cells	-	$3{,}72 \times 10^{-6}$
Paraquat	0,5	$*4{,}68 \times 10^{-6}$
	1	$*5{,}06 \times 10^{-6}$
	1,5	$*5{,}13 \times 10^{-6}$
Rotenone	0,001	$3{,}91 \times 10^{-6}$
	0,025	$4{,}74 \times 10^{-6}$
	0,05	$*4{,}81 \times 10^{-6}$
	0,075	$*5{,}13 \times 10^{-6}$
	0,1	$*5{,}26 \times 10^{-6}$

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* Statistical significance was determined by oneway analysis of Student T-test; *- significant at $p<0,05$ when compared to untreated control.

These results demonstrate a concentration dependence of the pesticides application and an increase of MDA level.

Discussion

Oxidative stress-mediated toxicity produced by application of pesticides paraquat and rotenone in SY5Y cells demonstrated the elevation of ROS and an increase in the lipid peroxidation. There is extensive evidence that a neurodegenerative disease, such as Parkinson's disease, is associated with oxidative stress [19]. Such an imbalance between the production of reactive oxygen species (ROS) and the ability to detoxication of the reactive intermediates may be due to an abnormal endogenous process or the action of exogenous and environmental neurotoxicants, in particular, pesticides such as herbicide paraqauat and insecticide rotenone [20].

The ROS generation leads to the production of hydrogen peroxide, superoxide, and hydroxyl radicals, resulting in oxidative stress [21]. Current data confirmed that pesticides paraquat (1 mM) and rotenone (20 μM) produced an increase of ROS in neuroblastoma SH-SY5Y cells in a time dependent manner.

MDA is a marker of lipid peroxidation, and is used to determine the degree of oxidative stress. An increase in MDA level brings changes in the endogenous antioxidant system and oxidative damage, such as lipid peroxidation [22].

The findings of this study are consistent with the idea that neurotoxicants paraquat and rotenone may induce oxidative stress and lead to neuronal death.

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ESSENTIAL ENVIRONMENTAL PROBLEMS OF REGIONS

Adarchenko I.A.

EL PROBLEMA DE LA QUEMA DEL GAS NATURAL: SITUACIÓN ACTUAL

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Resumen: El ensayo está dedicado a la quema del gas asociado y los aspectos ecológicos del uso de gas.

Palabras claves: Gas natural, gas no asociado, gas asosiado, medio ambiente, petroleo.

Annotation: This article is devoted to flaring of associated petroleum gas (APG). The author covers a term “Natural gas” with its classes. She makes a point of ecological aspects of using the gas.

Key words: Natural gas, non-associated gas, associated gas, environment, oil.

El gas natural es una mezcla de gases formada en las entrañas de la tierra a causa de la descomposición anaeróbica de los compuestos org’anicos. Dependiendo de su origen el gas natural se clasifica en gas asociado y no asociado.

El gas no asociado es el gas que se encuentra en los depositorios que no contienen cantidades significativas de petróleo crudo. A menudo se halla a mayor profundidad, donde el calor divide los hidrocarburos en moléculas de gas más pequeñas y ligeras.

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El gas asociado se encuentra acompañado del petróleo crudo, disuelto en el crudo o como un 'tapón' de gas libre por encima de yacimiento de petróleo. Él contiene grandes cantidades de hidrocarburos como etano, propano, butano y naftas.

El gas natural es un combustible más limpio que el carbón y el petróleo, ya que en su combustión produce menos sustancias dañinas que en los otros productos derivados del petróleo. Pero problema de la quema del gas asociado es una de las más importantes para nuestro país, ya que Rusia tiene el rango de liderazgo en el mundo sobre los volumenes de la quema de gas.

Durante muchos años el gas asosiado fué considerado inútil. La quema del gas asociado contribuye al efecto invernadero, afectando la salud, medio ambiente y economía del país. La quema de gas libera dióxido de carbono, negro active y metano. La cantidad de las emisiones se estima aproximadamente en media tonelada por año. Además, en torno de la antorcha quemadora el radio de la degradación térmica del suelo varia entre 10 a 25 metros, y vegetal varia de 50 a 150 metros. Asimismo la atmosfera se contamina con los productos de la quema del gas asociado y con diversos hidrocarburos no quemados. Ello contribuye al aumento de enfermedades entre la población como cáncer de pulmón, bronquios, disfunciones de hígado y tracto gastrointestinal, sistema nervioso y vista.

Hay muchas maneras de utilizar el gas asociado, pero en la práctica se usa sólo unos pocos. El método principal de la utilización del gas asociado es su división en componentes. La mayor parte de ellos lo conviertiere en gas natural, y la otra parte – en una materia prima para la indústria petroquímica. También se puede utilizar el gas asociado para la generación de la energía. Eso permite a las compañías petroleras resolver el problema de suministrar la energía sin comprar electroenergías. Además, el gas asociado devuelven en el suelo, lo que permite aumentar el nivel de extracción de petroleo. Aún así, la quema del gas sigue siendo popular, ya que el uso del gas asosiado relacionado a la generación de energía requiere costos adicionales.

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Pero recientemente la situación con la utilización del gas asosiado se ha comenzado a cambiar. Las compañías petroleras prestan más y más atención sobre el problema del uso racional del gas. Con el laudo #7 (8 de Enero del 2009) el Gobierno de Rúsia estimula la activización de este proceso. Se trata de utilización del gas asociado a 90%. De lo contrario, las compañías petroleras deberán pagar las multas muy altas.

Además, el 17 de Abril del 2015 los altos mandos de las compañías petroleras y los funcionarios de los Gobiernos de los países-productores del petroleo se han reunido y han llegado al acuerdo que para el 2030 se detendrá la quema del gas asociado en yacimientos petroleros.

Por lo tanto, la situación del gas se mejora gradualmente, pero sigue habiendo consequencias y se requiere tiempo para solucionarlas.

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USING NDVI VALUE AS AN INDICATOR OF DESERTIFICATION IN THE REPUBLIC OF KAZAKHSTAN

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Abstract: This work was carried out by using the available literature and cartographic sources that allowed the author to identify the area most susceptible to desertification in Kazakhstan, as well as to monitor the difference in the vegetation index values. The paper shows the relationship between climate processes and the degree of land degradation, which is an important step to understand the mechanism of desertification and is a capacity to deal with it.

Key words: desertification, climate aridization, land degradation, geo-ecological problem, areas prone to desertification, normalized difference vegetation index.

In the recent decades the modern process of desertification has been developing in terms of global warming, which is characterized by an increase in average surface temperature on land, especially in arid inland regions [1]. The most significant natural cause contributing to the development of desertification is a climate. Climate aridization is considered to be the initial phase of desertification. Supporting of aridization by positive albedo-rainfall feedback on a regional scale is considered to be climatic desertification [1].

Overall, desertification should be viewed as the result of two-component interaction: the climate aridization and anthropogenic degradation of drylands.

The relevance of the work lies in the fact that desertification is one of the most serious threats to Kazakhstan.

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This geo-ecological problem affects about two thirds of the country's surface, and therefore it is very important to identify and to solve it on time. This became possible due to the indicators of climate aridization, one of which is the vegetation index.

The purpose of this work is to identify areas prone to desertification in Kazakhstan using NDVI indicator.

To achieve this goal the following tasks have been completed:

1. The map of maximum distribution of the NDVI relative value in the territory of Kazakhstan for the period 2000-2005 has been studied and the comparative analysis has been carried out.

2. The areas prone to desertification have been identified and the degree of land degradation in Kazakhstan has been determined.

Due to the excessive economic activity, the properties of the underlying surface (albedo, aerodynamic parameters, humidity, etc.) are changing. It affects the heat exchange between the earth's surface and the ground atmosphere. Peculiarities of vegetation and land cover of zonal ecosystems serve as indicators of the mechanism controlling the temperature of the underlying surface, and therefore as indicators of the nature of its heat exchange with the atmosphere [1].

In this paper, for the detection and early prevention of degradation processes indicators of desertification are used.

Normalized Difference Vegetation Index NDVI is a simple quantitative measure of the amount of photosynthetically active biomass. It is one of the most common indices used to solve problems, using quantitative assessment of vegetation [2].

It is calculated according to the following formula:

$$NDVI = \frac{NIR - RED}{NIR + RED},$$

where:

NIR - reflection in the near infrared region of the spectrum

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RED - reflection in the red region of the spectrum

The index is highly sensitive to changes in the volume of biomass, which helps quickly identify the occurring disturbances in the environment. With the index NDVI, as an indicator of climatic desertification, the territory of Kazakhstan was divided into five groups according to degrees of intensity of the degradation processes [4]:

Low > 40% (areas with a high level of landscaping).

Average 30% - 40%;

Moderate 20% - 30%;

High 10% - 20%;

Very high 10% (desert);

Thus, analyzing the map in terms of the vegetation index, you can highlight areas that are particularly susceptible to desertification - Mangystau, Kyzylorda regions, the northern districts of South Kazakhstan and Zhambyl regions, the north-western part of Almaty region (the south-eastern part of Karaganda region). North Kazakhstan, Akmola, Kostanai and East Kazakhstan regions have dense vegetation. This fact results in the least degree of manifestation of degradation processes here. However, the dynamics of land degradation has been traced in the period from 2000 to 2005. In 2000, an intensive process of desertification occurred in Mangystau, Kyzylorda regions and Balkhash. In 2002, it was clearly noticeable that these areas were not so degraded, and areas with high vegetation levels expanded. By 2005, there was a tendency for desertification and land degradation in southern regions again, but the extension degree has increased. Perhaps this can be attributed to an increase in the rate of reduction in rainfall, drought [3].

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Алтангэрэл Дамбын

БИОЛОГИЧЕСКАЯ РЕКУЛЬТИВАЦИЯ НАРУШЕННЫХ ЗЕМЕЛЬ НА БАГАНУРСКОМ УГОЛЬНОМ РАЗРЕЗЕ (ЦЕНТРАЛЬНАЯ МОНГОЛИЯ)

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Аннотация: Статья посвящена изучению процесса биологической рекультивации нарушенных земель при открытой добыче полезных ископаемых на Баганурском угольном разрезе (Центральная Монголия). Рассматриваются проблемы использования нарушенных земель в сельскохозяйственном и лесохозяйственном производствах, а также для рекреационных целей. Целесообразно на местах разрушения образовавшихся экосистем произвести лесопосадку деревьев и кустарников и, тем самым, восстановить растительные сообщества на нарушенных землях.

Ключевые слова: самовосстановление, открытая добыча, нарушенные земли.

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Abstract: The article is devoted to the study of the process of biological restoration of lands, damaged at open mining of mineral resources in Baganur brown coal deposit (Central Mongolia). We consider the possibility to use damaged lands for agriculture and forestry as well as for recreational purposes. It is offered to perform a self-restoration of plant groups on the surface of waste dumps that have not undergone the first stage of reclamation, where their restoration depends on the presence of potentially fertile overburden rocks. The restoration is offered, which promotes a sustainable formation of pioneer vegetation. It is expedient to make forest plantations of trees and shrubs at places of destruction in formed ecosystems and thereby restore plant communities on damaged lands.

Key words: self-restoration, open mining, damaged lands.

Введение. В настоящее время на территории Монголии ведется широкомасштабная разработка и добыча месторождений каменного и бурого угля. Наиболее крупным и перспективным месторождением считается Баганурский угольный разрез, расположенный у подножья южного пологого склона хр. Малый Хэнтэй на высоте 1380 м над уровнем моря и занимает площадь 50 км^2 при глубине 200 м. Разработка месторождения угля была начата с 1978 г. и добыча его, в среднем за год, составляет 3,2 млн. т, что обеспечивает 60% потребления энергетической отрасли Монголии [1].

В результате горнодобывающего производства произошло существенное нарушение взаимодействующих природных компонентов, составляющие в целом антропогенный ландшафт. Так, например, к 2014 г. на территории Баганурского месторождения было выведено из сельскохозяйственного оборота более 400 га земель. А по прогнозным оценкам к концу разработки угольного разреза площадь нарушенных земель увеличится и составит около 618,2 га. Эта проблема остается актуальной для Монголии, так как ежегодно увеличивается площадь нарушенных

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горными разработками земель, и при этом процесс рекультивации практически не проводится. В связи с этим, биологической рекультивации здесь подлежат: поле разреза, внешние отвалы, технологические автодороги, железнодорожные пути, угольный склад, карьерная подстанция. На основании наших исследований и проекта горнотехнической рекультивации земель, нами были определены основные этапы рекультивационных работ, составлена схема развития растительности на нарушенных землях, которая происходит по типу сингенеза.

Результаты исследования и их обсуждение. Проводимые здесь горные работы, охватившие обширный район Хэнтэйского нагорья, осуществлялись в основном без проведения биологическихх рекультиваций нарушенных земель. В целом воздействие горнопроходческих и опытно-эксплуатационных работ на окружающую среду выразилось во временном изъятии из земельного фонда значительной территории, в загрязнении атмосферы взрывными работами, в образовании мелкосопочных отвалов с мелкими кучеобразными и сопкообразными гребнями (высотой до 30 м) и мелкими карьерами глубиной 20-25 м, заполненные водой.

В результате проведенных работ нами выявлено, что за 35 лет на поверхности отвалов произошли существенные изменения: отвалы не прошедшие первоначальный этап рекультивации, покрылись растительными группировками, активно протекают стадии сингенетических сукцессий. Все это свидетельствует о потенциальной плодородности вскрышных работ и благоприятных для самовосстановления экологических условий на Баганурском месторождении.

Сельскохозяйственная рекультивация. Проведение биологической рекультивации, по нашему мнению, должно проводиться путем сельскохозяйственного восстановления нарушенных земель. Это направление наиболее требовательно к предыдущему горнотехническому этапу

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восстановления нарушенных земель. Площадь, предназначенная для проведения сельскохозяйственных работ, составляет 420 га. Предлагается рекультивацию производить на выположенных участках отвалов и понижениях у водоема.

Следует отметить, что восстановление пашни на первоначальном этапе представляется не целесообразным, поскольку для произрастания зерновых культур необходимо быстрое восстановление гидрологического режима территории. Считается, что такого состояния очень сложно достичь в первые годы после начала проведения биологической рекультивации. Необходимо сказать и о том, что зерновые культуры крайне требовательны к плодородию, а воссоздать пашенные участки с нанесением необходимого объема почвенного слоя представляется не реальным, поскольку требует значительных финансовых затрат.

Наиболее оптимальный вариант сельскохозяйственного восстановления территории – это создание пастбищных угодий. При восстановлении территорий под пастбищные угодья необходимо ориентироваться на свойства естественных почв, распространенных на территории разреза. При осуществлении рекультивационных работ с нанесением почвенного слоя требуются дополнительные мероприятия для восстановления плодородия насыпного слоя. Для этого нами предлагается использовать многолетние злаково-бобовые травосмеси с частичным нанесением минеральных удобрений. В целом применение минеральных удобрений будет способствовать более быстрому восстановлению плодородия почв. Многолетним опытом доказано, что посев многолетних трав благоприятно действует на снижение плотности нижних слоев плодородного слоя почвы и верхних слоев породы, способствуя восстановлению структурного слоя и плодородия почв [1,2, 3].

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Посев многолетних трав приводит к активизации деятельности микрофлоры, изменяется ее качественный и количественный состав, повышается ферментативная активность. Длительное произрастание многолетних трав приводит к значительному накоплению органического вещества в почве, иногда на 2-3% выше уровня зональных старопахотных почв [4,5].

Исследования, проведенные в области сельскохозяйственного восстановления нарушенных земель с учетом агробиологических особенностей окультуренных многолетних трав и микроклиматических условий, свидетельствуют о том, что необходимо создание смешанных травосмесей из злаковых и бобовых культур. На выровненных площадях отвалов, после проведенных горнотехнических рекультиваций, рекомендуется осуществлять посев многолетних культур путем применения травосмеси из люцерны гибридной, овсяницы луговой и костра безостого, или же из люцерны гибридной, тимофеевки луговой и костра безостого. А на склонах выровненных отвалов с крутизной более 5-6^{o} необходимо осуществлять высев травосмеси из люцерны гибридной и костра безостого, или же люцерны гибридной и житняка гребенчатого.

Лесохозяйственное восстановление. Лесонасаждения на отвалах выполняют важную мелиоративную, почвозащитную и оздоровительную функцию, и считается самым простым способом биологического освоения нарушенных земель. Лесовосстановительными работами в Баганурском месторождении могут быть охвачены не более 100-120 га нарушенных земель. Его можно здесь осуществлять там, где земли не пригодны для сельскохозяйственного освоения. Практика проведения таких работ показывает, как быстро лесные культуры осваивают новые окультуренные участки, показывая при этом высокую энергию роста [6]. Лесовосстановление мы

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предлагаем произвести на вершинах отвалов, на откосах и вдоль выездных траншей. При этом наиболее оптимальным вариантом для лесопосадки может стать сосна, как наиболее устойчивый местный вид, приспособленный к физико-географическим и экологическим условиям южной части Хэнтэйского нагорья. Сосна, как известно нетребовательна к почвенному плодородию и влажности и тем самим превосходит многие лесообразующие породы. Но, однако, такие лесонасаждения не желательны, так как посадка только одной сосны менее эффективна, чем смешанные из-за ее неустойчивости противостоять против негативных факторов, как болезни, вредители и пожары. И поэтому наиболее эффективна, по нашему мнению, комбинированная лесопосадка.

Комбинированных посадок, по нашей рекомендации, уже начали применять на пробных площадках выровненных отвалов. В этом случае полнее используются почвенные ресурсы среды, что очень важно в условиях восстанавливаемых земель. На подготовленных к лесопосадке участках, были введены 30-40% кустарниковых видов, в частности облепихи. Эксперименты проводились по следующей схеме: 3 – сосны и 2 облепихи (3С2О – 60% сосны и 40% облепихи). Посадка проводилась путем кулисного смешения сосны с облепихой (мелиоративным кустарником). Облепиха как местный вид, морозо- и жароустойчива, светолюбива и уже демонстрирует достаточно хороший показатель роста. Одновременно облепиха, имея обильное образование корневых отпрысков, способствует быстрому закреплению поверхности отвалов и сохранению откосов от проявления водной эрозии почв. Кроме того, кустистая и быстро растущая облепиха хорошо задерживает снег и тем самым предохраняет сосну от зимнего иссушения хвои. Сосна и облепиха в совместной комбинации способны обеспечивать себя биологическим азотом, растворять труднодоступные запасы фосфора

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техногенного элювия и преодолевать действие ряда ограничивающих факторов. Как показывает практика, их способность произрастать в экстремальных условиях восстанавливаемых земель делает эти породы незаменимыми для лесной рекультивации техногенных территорий.

Водохозяйственное восстановление. Этот метод рекультивации нарушенных земель применим в том случае, если появиться необходимость на месте больших карьеров – образование водоема. Для создания водоема на территории Баганурского месторождения может быть отведен около 80 га. Это остаточный объем выработанного пространства от последних добычных заходок и выездные траншеи, которые будут частично засыпаны и выположены путем переэкскавации потенциально-плодородных пород. Нам представляется, что водоем может послужить образованию водоохраной зоны, которая будет представлять лесопарк или декоративно-озеленительную площадку для отдыха. Одновременно возможно формирование устойчивой экосистемы водоема, так как он должен быть достаточно глубоким, дно относительно плоским, а 30-40% его общей площади обустроено как мелководная зона.

Выводы**.** *Прогнозная оценка состояния геосистем после рекультивационных мероприятий.* На Баганурском угольном разрезе степень деструкции природных ландшафтов, занятых месторождением подразделяется на две категории:

- ландшафты, частично видоизмененные под воздействием хозяйственной деятельности человека. В этом случае функциональная деятельность полностью восстанавливается в результате проведения биологической рекультивации нарушенных земель;

- ландшафты, коренным образом преобразованные хозяйственной деятельностью. Они обычно восстанавливаются по мере проведения правильных биолого-рекультивационных работ.

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Следовательно, предполагаемые восстанавливаемые ландшафты после отработки месторождения, а затем проведенные рекультивационные работы должны быть в целом такими же естественными природными ландшафтами, какими были до освоения месторождения или хотя бы близко напоминающие естественную среду.

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ECOLOGICAL AND GEOGRAPHICAL FEATURES OF THE ESTATE ZNAMENSKOYE-SADKI

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Abstract: Farms are rural areas of land where plants and animals species can be found living in order to soils variety there are. This article shows the importance of estates and its geographical and ecological features.

Key words: relief, soils, estate, ecological, geographical, forest, species.

The farmstead is located within Bitsevsky Natural Park, in the South-West Administrative District of Moscow.

The length of the park: from north to south - 10 km, From west to east - 3-6 km. The park area is 2300 hectares.

There are the following functional areas in the park: nature reserve status, reserve management, and regulated recreational and commercial use.

There are historical and architectural monuments in the Bitsa Park. A palace and an estate of XVIII-XIX centuries "Znamenskoye Cages", "Yasenevo", "narrow". They form a single Bitsa forest, natural, historical and cultural complex. [1, 2]

Natural Park "Bitsa Forest" is located in the south-eastern part of Teplostanskoy a hill at an altitude of 130-135 m above the Moskva river edge. The absolute level of the surface is 170-250 m; the general slope of the - in the north-east to the Moskva river valley.Teplostanskoy hill portion of the Moskva-Oka rolling interfluvial moraine-erosion plains.

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Features of the geological structure and relief, including the nature of a step hill, defined development boundary of the Moscow glaciation.

The lower levels of the relief water glacial plains are composed of water-glacial and lacustrine sediments of the upper levels of the glacial plains folded moraine Moscow glaciation. Volume of quaternary deposits is 10 - 20 m to 30 m.

Teplostanskoy hill is dissected by deep erosion valleys and ravines on the slopes of which there are landslides and mud-stream shallow.

On the terraces and alluvial floodplains there are common sands and sandy loams.

The climate is continental, major climatic parameters:

• The average temperature of the coldest month - 10,3ºC;

• The average temperature of the warmest month - 18,1ºC;

• The average annual precipitation is 716 mm.

The rivers flowing within the park are the Chertanovka, the Gorodnia flowing into the river Moskva, the Bitza flowing into the river, the Pakhra. There are numerous tributaries - brooks flowing along the bottom of the ravine.

The rivers are V-shaped valley to 100-150 m wide, with steep slopes, partially steep, with gullies and sometimes - growing ravines.

The rivers are filled by snow, rain, underground waters. The fall of the river and urban waste water contribute to their adverse ecological state.

On the territory of Bittsevsky forest and its surroundings there are several artificial ponds, for example, in the vicinity of the "narrow" in the estates "Yasenevo", "Znamenskoye-Sadki", in the recreation area "Bitsa".

There were also springs, with the status of state natural monuments of local importance.

The main soils are sod-podzolic soils on mantle loams, loams moraine, glaciofluvial sands. The depressions occur in the sod-podzolic gley soils.

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Also common soils are:

• sod medium srednesuglinistye on mantle loams (top and elephants watersheds);

• sod-podzolic medium-loamy soils on mantle loams (pridolinnye priovrazhnye and slopes);

• soil eroded slopes of ravines and river valleys

• namytye layered soil bottom of the slope, the bottoms of ravines and river valleys.

There are gray forest soils. [4, 5]

Oaks, birch, linden, aspen, pine Pinetum compositum are common for the park and the estate Znamenskoye-Sadki. There are meadows, bog communities.

Flora of the Bitsevsky park comprises about 500 species of vascular plants. To date there are 341 species belonging to 66 families registered. The leading role belongs to the Asteraceae family of plants - 37 kinds of cereals - 32 species and Rosaceae - 28 species.

Despite the fact that the forest is surrounded by densely populated Bitsevsky residential areas, as well as the high attendance of the park, it is marked by rare species of herbaceous plants, such as lily of the valley, Corydalis, Myosotis sylvatica, bells persicifolia, broadleaf and nettle-leaved. There are few members of the family of orchid - Platanthera bifolia, Orchis Fuchs.

The area is located in the deciduous forest zone. V.V.Alehin (1947) identified Teplostanskoy hill as a special area, calling it "an island, cut off from the right bank of Tula spotted," noting the presence here of a number of southern elements, such as ash.

An interesting feature of broadleaf forests significant and ongoing involvement in their lineup of small-leaved species - birch bowed, aspen (20-25%).

There are oaks, linden, both natural and artificial origin, pine, spruce and mixed forests.

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In the undergrowth there are linden, oak, maple; in the undergrowth - filbert, euonymus, honeysuckle, mountain ash.

There are small-leaved forests about 38% of the forested area. Birch, aspen forests occupy large areas.

The Bitsa Forest and Manor Znamenskoye SADC- marked spaces alder, black alder, often in floodplains.[3]

Fauna of the Bittsevsky forest and its surroundings, despite a significant human influence differs significantly for the urban environment and the diversity of the high number of representatives of certain species of birds and mammals. 133 species of terrestrial vertebrates, including 28 species of mammals, 96 species of birds (86 of them - breeding), 3 species of reptiles and 6 species of amphibians were registered. The species diversity of the forest animals in Bittsevsky Park has an advantage compared to other forest parks of Moscow.

Among the mammals there are moles, shrews, mice, voles, rabbits, squirrels.

Birds are represented by ducks, mallards, birds of prey, owls, woodpeckers. There are swifts, swallows, and other birds.

There are numerous insects.

Thus, despite the location of the site in large metropolitan areas and the associated diverse anthropogenic impact in the woods and Bitza Manor Znamenskoye cages preserved natural and natural-anthropogenic forest, meadow landscapes, appropriate zonal types of landscapes and mixed deciduous forests.

The ecological state of the landscape, depending on the types of human impact, differs, often adversely. Recreational load, littering, trampling, as the main form of human impact in different parts of the park varies in intensity leading to varying degrees of violations of ecosystems.

However, security measures that apply in this area, contribute to the preservation of biodiversity, rare species of plants and animals.

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Also area of the park and the estate can serve as a training base for scientific research, including students.

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LA ESTABILIDAD ECOLÓGICA DE LOS PANTANOS TROPICALES EN CONDICIONES DE CONTAMINACIÓN POR PETRÓLEO Y PRODUCTOS DEL PETRÓLEO (EN EL CANTÓN LAGO AGRIO, AMAZONÍA, ECUADOR)

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Resumen: En el presente trabajo se han estudiado los problemas del impacto de la contaminación petrolera en los ecosistemas de los pantanos en el cantón de Lago Agrio en la Amazonía ecuatoriana. Se han analizado datos reales y literarios y se demostraron las características ambientales del impacto de la contaminación petrolera en la biota y la población del cantón. Se llevó a cabo la evaluación de la

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estabilidad y contaminación de los pantanos en Lago Agrio. Con base en las investigaciones hechas, los autores proponen las recomendaciones necesarias para el control de la contaminación de los pantanos y la conservación de la salud de los habitantes del territorio de Lago Agrio.
Palabras claves: ecosistema pantanos, Amazonía, Ecuador, Lago Agrio, petróleo, contaminación petrolera.

Abstract: In the present paper we consider the problem of the impact of oil pollution on swamp ecosystems in the area of Lago Agrio in the Ecuadorian Amazon. We had analyzed facts and literature data and also identified environmental characteristics of the oil pollution impact on the biota and the population of Lago Agrio canton. Stability and pollution in swamp ecosystems of Lago Agrio is evaluated.
On the basis of the research, the author proposes recommendations for the control of pollution in swamp ecosystems and the preservation of health on the Lago Agrio territory.

Key words: swamp ecosystems, Amazon, Ecuador, Lago Agrio, oil, oil pollution.

Sumak Kawsay, es una frase que proviene del quechua y significa "buen vivir". Este concepto fue introducido por la comunidad aborigen de la Amazonía ecuatoriana, y sugiere que la conservación del equilibrio natural de los recursos naturales renovables es uno de los elementos esenciales para el desarrollo progresivo y armónico de la civilización y de toda la naturaleza de la región en general.

El cantón Lago Agrio se encuentra en el centro de la provincia de Sucumbíos, en el noreste de la República del Ecuador y su área es de aproximadamente 3 143,21 km^2. La historia de la producción de petróleo en el cantón se inició en 1967 [3, p. 8].

Características ambientales de los pantanos en la zona de Lago Agrio. En Ecuador, la clasificación de los humedales es establecido por la Convención de Ramsar sobre los Humedales.

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En el territorio de Lago Agrio dominan los pantanos de agua dulce y los bosques inundados. Se forman en las terrazas bajas y altas de los valles fluviales y a lo largo de las riberas de los ríos, se alimentan de precipitaciones atmosféricas, de sustancias minerales pobres y de aguas subterráneas y superficiales.

La vegetación se compone principalmente de arbustos, lianas, musgos y plantas palustres y flotantes: annona glabra, pistia stratiotes, scirpus californicus, phragmites commúnis, entre otras. En cuanto al mundo animal, podemos encontrar ejemplares como el opisthocomus hoazin, hydrochoerus hydrochaeris y varios tipos de peces, aves, insectos y microorganismos. Los pantanos de Lago Agrio están estrechamente relacionados con la biogeocenosis del bosque [1, p. 8].

Aspectos ambientales del impacto del proceso de extracción del petróleo**.** En la zona de Lago Agrio se llevan a cabo los siguientes trabajos ligados con la extracción del petróleo: prospección, perforación, extracción, tratamiento preliminar superficial, conservación, transporte, venta e industrialización.

Examinaremos algunos hechos que confirman el peligro de la situación ambiental ligada con la extracción del petróleo en Lago Agrio.

Desde 1994 hasta junio del 2002, en el territorio de Ecuador se detectaron 779 derrames de petróleo, con un promedio de 92 derrames por año u 8 por mes, los cuales cayeron en el suelo y en los cuerpos de agua, incluidos en los ecositemas de los pantanos. Muchos de los derrames fueron causa de incendios, lo que llevó a la contaminación del aire y el agua [1, p. 8].

La contaminación del suelo y del agua**.** Los principales contaminantes del medio ambiente durante los procesos tecnológicos de la extracción del petróleo son: el petróleo y sus productos, los gases de azufre y sulfuro de hidrógeno, aguas de formación y residuales de los campos petroleros y de la perforación de los pozos, los lodos de perforación, el agua tratada y los reactivos químicos utilizados para intensificar el proceso de

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extracción de petróleo, la perforación y el tratamiento del petróleo, gas y agua.

Durante la operación de pozos se han reportado numerosos accidentes de derrames de petróleo. Por ejemplo, en 2010 en el territorio de Lago Agrio se registraron 219 derrames. Además de eso, a veces los desechos tóxicos se almacenan de manera abierta en piscinas que no están selladas o son almacenados directamente cerca del lugar de la extracción del oro negro. Todo esto conduce a la contaminación de los suelos y de las aguas subterráneas [1, p. 8].

El impacto en la población**.** Las aguas superficiales son la principal fuente de agua potable y cultural en Lago Agrio, su contaminación debido a las aguas servidas y desechos del proceso de extracción del petróleo lleva a un aumento de la morbilidad entre la población de Lago Agrio.

De acuerdo con el informe de Yana Curi y con los datos del Instituto de investigación de la universidad católica de la ciudad de Guayaquil, los habitantes de Lago Agrio en general sufren de cáncer, aborto espontáneo, aparición de enfermedades fúngicas en la piel, fatiga, irritación de los ojos, dolores de cabeza, enfermedades de las vías respiratorias y otras [2, p. 8].

Evaluación del potencial de auto-recuperación de los pantanos en el cantón de Lago Agrio**.** Evaluación de la estabilidad ecológica de los pantanos en Lago Agrio. Los pantanos del territorio de Lago Agrio tienen las siguientes características físico-geográficas e hidrológicas: el área de la superficie no supera los 10 km^2; su volumen oscila entre 0,2 y 0,4 km^3; la profundidad máxima alcanza los 3 m; se observa una variación del nivel del agua al año de menos de 3 m; la temperatura media del agua en verano: de 25 ° C a 30 ° C; no se observa congelamiento; existe un débil desarrollo de estratificación; el movimiento vertical del agua ocurre 2 veces al año; las condiciones de la corriente: el agua constantemente se escurre en algún lugar; el carácter de regulación de la corriente: ocurre por temporadas y el cambio de agua al año se da de 0,1 a

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5,0 (el cambio de agua se expresa por medio del coeficiente de cambio de agua).

Con base en los datos anteriores, la evaluación se efectuó con ayuda del documento de la Federación Rusa: **GOST 17.1.1.02-77** " Protección ambiental. Hidrósfera. Clasificación de los cuerpos de agua" por factores físico-geográficos e hidrológicos [3, p. 8]. Como resultado del procedimiento, de acuerdo a la suma de los índices de diferentes factores, obtuvimos la cantidad de 16 y de acuerdo a la evaluación por puntos, se encontró su símbolo y puntos para determinar la sustentabilidad o estabilidad del cuerpo de agua.

Con base en la evaluación de la versión desarrollada por Vasily Vasilevich Dmitriev en 1997-1998, "Clasificación del bienestar ambiental de los ecosistemas acuáticos" [4, p. 8], nuestro objeto de estudio tiene un nivel medio de bienestar ambiental de acuerdo al factor " sustentabilidad (puntos) del documento GOST 17.1.02-77".

Evaluación de la contaminación de los pantanos en Lago Agrio. La evaluación de la calidad del agua se llevó a cabo con la ayuda del documento RD 52.24.643-2002 "Método para una evaluación compleja de la contaminación de las aguas superficiales mediante indicadores hidroquímicos" con el cálculo del índice específico combinatorio de la contaminación del agua (UKIZV). En las tablas 1 y 2 se muestran los resultados de los cálculos, los cuales demuestran que nuestro objeto de estudio pertenece a la 5 categoría, es decir, cuerpo de agua extremadamente contaminado de acuerdo al anexo K del documento RD 52.24.643-2002 [5, p. 8].

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Tabla 1. Resultados de la primera parte de los cálculos de UKIZV.

№ Muestras	*DBO**	*Frecuencia de exceso de CMP***	*TPH**** *(ppm)*	*Frecuencia de exceso de CMP*
1	*3,19*	*1,595*	*0,043*	*4,3*
2	*2,34*	*1,17*	*0,028*	*2,8*
3	*3,12*	*1,56*	*0,036*	*3,6*
4	*3,78*	*1,89*	*0,028*	*2,8*
5	*3,54*	*1,77*	*0,097*	*9,7*
Suma		*7,985*		*23,2*

*Demanda biológica de oxígeno.

**Concentración Máxima Permisible.

*** **Total petroleum hydrocarbon** (Hidrocarburos totales de petróleo).

Tabla 2. Resultados de la segunda parte de los cálculos de UKIZV.

Nombre	CMP	Sa	Sk	Sb	S
DBO	2,000	4,000	1,59	4	16
TPH (ppm)	0,01	4	4,64	[3; 4)	14
				SA	30
				UKIZV	15

Sa, Sb: puntos o coeficientes particulares de evaluación.

Sk: valor medio de la frecuencia de exceso de CMP.

S: producto de la multiplicación de los coeficientes Sa y Sb.

Conclusiones

1. En el territorio de Lago Agrio, cantón situado en la zona ecuatorial, existen pantanos de agua dulce excepcionales y bosques inundados, que son el hogar de plantas y animales endémicos y muy valiosos, incluyendo los microorganismos que crean las condiciones para una interacción armoniosa entre ellos y su medio ambiente.

2. Se evidenció que el impacto del proceso de extracción del petróleo sobre los ecosistemas acuáticos y de los pantanos

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contribuye a la degradación progresiva de los componentes ambientales vitales a través de cambios en sus propiedades físicas, físico-químicas, hidrológicas y biológicas, también a través de la contaminación y el manejo irracional de los recursos hídricos y del suelo de dichos ecosistemas.

3. Los resultados de la evaluación de la estabilidad de los pantanos en Lago Agrio indican que el objeto que no está expuesto al peligro de contaminación por petróleo y sus productos tienen un grado medio de bienestar y la evaluación de contaminación del objeto que está expuesto a alguna contaminación, pertenece a la categoría: agua extremadamente contaminada.

4. Los resultados permiten dar la siguiente conclusión: el nivel de biomasa que regula la estabilidad de un cuerpo de agua se encuentra por debajo de los límites requeridos para mantener el bienestar ecológico de los pantanos.

5. Para mejorar la calidad de los componentes ambientales de los ecosistemas de los pantanos y para al conservación de la salud de los habitantes del cantón de Lago Agrio, es necesario realizar lo siguiente:

• Crear un sistema de monitoreo ambiental del agua y del suelo empleando métodos modernos de control, tales como físico-químicos y métodos de bioindicación;

• Ejecutar teledetección de los humedales con ayuda de aviones, satélites y barcos y elaborar mapas que muestren los lugares donde se extrae el petróleo;

• Desarrollar recomendaciones prácticas para la población para garantizar el consumo seguro del agua, normas sanitarias y normas para el personal de las compañías petroleras.

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THE PROBLEMS OF AIR POLLUTION BY VEHICLES IN THE CAPITAL OF KAZAKHSTAN

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Abstract: The scale of air emissions growth cased by vehicles in Astana was assessed as well as the relevant legislative framework of Kazakhstan; solutions were proposed that can reduce the emission of pollutants, mainly volatile organic compounds into the atmosphere of the city.

Key words: vehicles, the exhaust gases, volatile organic compounds, the index of air pollution.

Since 1998, after the capital of Kazakhstan was moved from Almaty to Astana, the city's population has been constantly growing. According to current accounting on January 1, 2015 it was 852,985 people. Along with this number of vehicles increased. As of July 1, 2015 299.5 thousand units of vehicles were registered in Astana city. For comparison, in 2008, there

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were 155 thousand vehicles. The total length of the city route network is (2014) - 1720 km [1, p.12]. As you know, in the big cities road transport it is a major source of air pollution - one of the most important components of the environment.

The aim of this article is to analyze the problem of air pollution by vehicles in the capital of Kazakhstan.

According to the city administration, the index of air pollutionin 2014 decreased by 2.1% compared to 2012. Index of green plants per 1 person increased by 7.6%. Environmental payments in 2014 got 28% more than in 2012, and financing environmental protection has increased more than 2.8 times. At the same time, the trend of increase of total air emissions from mobile sources exists. The structure API5 (air pollution index) predominates nitrogen city dust, carbon monoxide. Congestion causes traffic jams. By 2014, 2.5 times the increased value of the emissions of hydrogen fluoride and sulfur dioxide by 1.3 times. A similar situation was observed in the first half of 2015.

Table 1. Number of vehicles in Astana city of its using age as of 31.12.2014/01.07.2015

Type of vehicle	Number of vehicles by age, units				Total units of vehicles
	to 6 years	6 to 15	1 5 to 25	more than 25 years	
Cars, units; the proportion of the total,%	71 381/ 87 784 31,3/33,6	59 865/ 70 333 26,2/27,0	76 144/ 81 440 33,3/31,2	21 096/ 21 387 9,2/8,2	228 486/ 260 944 100,0
Trucks, units; the proportion of the total,%	4 339/ 5 213 20,9/22,7	6 320/ 7 005 30,5/30,5	5 171/ 5 567 25,0/24,2	4 883/ 5 188 23,6/22,6	20 713/ 22 973 100,0
Buses, units; the proportion of the total,%	1 063/ 1 493 21,3/26,2	2 199/ 2 408 44,1/42,2	1 072/ 1 136 21,5/19,9	650/ 669 13,1/11,7	4 984/ 5 706 100,0

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Other transport, units; the proportion of the total,%	1 385/ 1 783 15,6/18,0	2 460/ 2 771 27,7/28,0	2 365/ 2 547 26,6/25,7	2 672/ 2 798 30,1/28,3	8 882/ 9 899 100,0
Total, units; the proportion of the total,%	78 168/ 96 273 29,7/32,2	70 844/ 82 51 26,9/27,5	84 752/ 90 690 32,2/30,3	29 301/ 30 042 11,2/10,0	263 065/ 299 522 100,0

Table 1 presents information about number of vehicles as of 31.12.2014 and 01.07.2015. The number of transport units in the city is continuously increasing, only in the last six months it has increased by 36,457. Compared with 2012, the emission of harmful substances into the atmosphere from vehicles increased by 1.4% in 2014, while emissions of particulate pollutants reduced by 9.1% (Table 2).

Table 2. The emissions structure of contaminants into the atmosphere by vehicles in Astana city [1, p.15]

Contaminants	2014 in % to 2012	2012		2013		2014	
		Thousand tons		Thousand tons		Thousand tons	
Total emissions in the year, of them:	101,4	87,01	100	88,08	100	88,20	100
Solid	90,9	0,7	0,9	0,70	0,8	0,70	0,8
Gaseous, including:	101,5	86,24	99,1	87,38	99,2	87,5	99,2
sulfurdioxide	97,8	0,90	1,0	1,06	1,2	0,88	1,0
nitricoxide	107,6	6,41	7,4	6,17	7,0	6,90	7,8
carbonmonoxide	101,3	69,28	79,6	70,37	79,8	70,20	79,6

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hydrocarbons	98,9	9,27	10,7	9,42	10,7	9,17	10,4
Other	92,1	0,38	0,4	0,44	0,5	0,35	0,4

The structure of emissions in the atmosphere basically submitted with gaseous substances, mainly it is carbon monoxide (80%) and hydrocarbons [1, p.17]. The exhaust gases which consist of toxic hydrocarbons such as ethane, ethylene, benzene, toluene and carcinogenic polycyclic aromatic hydrocarbons structure (pyrene, anthracene, benzo(a)pyrene); aldehydes (formaldehyde, acrolein, acetaldehyde, and others.) form a group of volatile organic compounds (VOC) [2, p.11].

The most significant researches by gas chromatography/mass spectrometry for the content of VOC in air was conducted in the USA [3, p.170]. Samples were collected for five weeks during each of the summer of 1999-2005. It was found that the most common ecotoxicants - ethane, and there are significant concentrations of toluene and acetylene, which is directly related to emissions of exhaust gases of vehicles (Russo et. al., 2010). Determination of emissions of volatile organic compounds in Milan (Italy, 1998, 2002-2003) showed a lower concentration of toluene and benzene at the weekend. The researchers explain this fact by using less vehicles and the reduction of industrial production (Steinbacher et. al., 2005). Researches which conducted in the centre of London fixed xenobiotics in the atmosphere: methanol atsetataldegida, isoprene, benzene, ethylbenzene, toluene and acetonitrile. The highest concentrations were observed at evening time, characterized by a surge of movement of vehicles and the inclusion of heating in living spaces (Nemitz et.al., 2007) [4, p.309].

It can be concluded that increasing the concentration of volatile organic compounds in the air is directly related to the emissions of vehicles. Information about the impact of VOCs on

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human organism and the data on their interaction with proteins now are not enough, the connection of redox reactions and damage body tissues caused by volatile organic compounds are not fully understood. The impact of the VOC for 30 minutes (sufficient time for entry limonene and isoprene reacted with ozone) causing respiratory tract irritation in mice [5, p.516].

Currently, studies of roadside pollution in Astana are limited to heavy metals, particularly to lead. Due to the significant changes in requirements for environmental standards of vehicles and fuel the evaluation of lead-induced environmental pollution is becoming less relevant. While the need to consider other pollutants, such as volatile organic compounds, is becoming more popular. The most toxic components of vehicle exhaust gases, including carcinogens, are yet "out of control". Identification of landscape-geochemical patterns of migration of volatile organic compounds will serve as a basis for making practical recommendations on vegetation range. As you know, green spaces along the roadside spaces, parks and gardens - effective methods of reducing the level of gas contamination of the city.

The problem of green building and sustainable development highlights in the state policy of the Republic of Kazakhstan. From the President's Message to people of Kazakhstan and the Strategic Plan of Development of Kazakhstan till 2020: Diversification of the economy is the key to success. The way to solve it - it's forced industrialization and the creation of "knowledge societies". One of the priorities of diversification is the optimization of the control system of sustainable development and implementation of "green" policy of low-carbon economy, which includes attracting investment, solving environmental problems, reducing the negative impact of anthropogenic load, increasing the responsibility of natural resources to reduce emissions into the environment, complex waste processing [6, p.19], [7, p.6]. The legal base of the Republic of Kazakhstan illuminates relation to use of vehicles [8-12]. But it does not have any legal documents

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of relating to the reduction of the share of transport with high service life.

Thus, the following problems of air pollution from vehicles in Astana:

- The annual growth of air pollution gaseous pollutants, due to the increased number of vehicles;
- Low level of using alternative environmentally friendly transport;
- Lack of quality Auto-Motor fuel at the moment ecological class of fuel and/or motor vehicle, according to Technical regulations;
- Poor control over compliance with environmental vehicle classes 4 and 5;
- Lack of legal framework for the reduction of the share of transport with high service life;
- Lack of scientific and methodological basis for green building of the city.

Conclusions

In order to reduce vehicle emissions in Astana city is necessary to conduct the following activities:

1. Reducing traffic on city streets as well as its downtime at the crossroads in "idle" mode;
2. The use of fuel with low emissions of pollutants;
3. The gradual transition to environmentally friendly transport (electric vehicles, construction of bicycle paths, parking lots, rental and repair of bicycles);
4. Tighten control over compliance with the requirements prescribed by the current legislation, as well as the improvement of the legislative framework, including the reduction of the share of transport with high service life;
5. Development of science-based landscape-ecological framework of the city that will be the basis for green building;

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6. Identification of landscape-geochemical patterns of migration of volatile organic compounds for making practical recommendations on vegetation range.

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Alperen Dulge

OPTIMIZATION OF ENERGY, FOOD AND WATER NEXUS IN NILE RIVER COUNTRIES

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Abstract: This work focuses on optimization of water, food and energy situation in Egypt, Sudan and Ethiopia, by solving the potential conflicts between the countries, elaborating on economic benefits of the Nile River water usage. Water situations, agricultural production with their water usage and prices, energy situations and prices, dam information were found as the basic supporting information. A model was built to estimate the water level at selected locations. Water amounts, economic income, either from agricultural products or energy production were calculated. Suggestions have been made to make the situation more lucrative and more sustainable.

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Key words: water consumption, economic benefit, agricultural production, .mathematical model, river countries

Water is essential for life. Life is impossible without it. It has great importance for the production of essential needs such as agricultural crops and energy. The demands on water, food and energy increase as population grows. Water scarcity is a very important issue in the World, especially in Africa.

Water is limited, and its most efficient use is obligatory. Any waste of water is also a waste of energy and food. When this situation is considered economically, it is obvious that no economy can stand against importing water for water-end products. Water use should be arranged as a sustainable system, which every country and society should accomplish.

During the realization of the project, three African countries were examined; Egypt, Sudan and Ethiopia. Every country consumes its water mostly from the Nile River and couldn't survive without this river. Countries satisfy their irrigation, drinking water, energy production and fresh water needs from the river. The other water sources are precipitation, water re-use or treated wastewater and others.

Egypt, Sudan and Ethiopia are countries which have agricultural and energy production, economic and water use problems. Water amount taken from the Nile is not efficient enough to sustain the population because of inefficient agricultural and energy production. In case of any attempt for improvement, it becomes a political conflict between the countries this time, as it would or might affect the other country in a bad way.

These political or economic conflicts happen due agricultural or energy production and a sustainable and efficient water use can bring solutions between countries, as well as in the country. Therefore, building a system for water use, in order words, optimizing water use is essential. My magister work makes an attempt to optimize the water, food and energy

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situation in Egypt, Sudan and Ethiopia, by solving the potential conflicts between the countries, focusing on economic benefits and the main task was to optimize the water use in the most efficient way, in terms of energy or agricultural crop production with the highest yield of financial effect and also having the best compensational precautions if a damage to economy is inevitable.

Methodology

In order to do achieve the goal, there are three main parts to work in the thesis. They are as following respectively; finding necessary information to define the situation, building a model to calculate the water amount to work with and finding solutions or making suggestions to improve the situation, based on the information and the water amount to work with. Whole thesis has been set of five scenarios; agricultural, energy, economic, political and environmental. Agriculture and energy have been considered as the main scenarios and the others have been considered and studied under these two. The figure below shows a rough summary about the methodology:

Under the first part, following information has been gathered:

- Agricultural production of each country with their;
  - Amounts (ton)
  - Areas used (hectare)
  - Yield
  - Water usage (million cubic meter per day)
  - Unit and total prices (million US Dollar per ton)
- World agricultural market prices (million US Dollar)
- Unit water amount for agricultural production (cubic meter per hectare)
- Energy situations of each country;
  - Energy production amount (kiloton of oil equivalent)
  - Electricity production amount from

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hydroelectricity (kiloWatthour)

- Electricity production amount (kiloWatthour)
- Electric power consumed (kiloWatthour)
- Electric power consumed per capita (kiloWatthour)
- Energy prices (US Dollar per kilowatthour)

- Dam list;
  - Name
  - Location
  - Energy produced (megawatt)

Throughout the thesis, two terms have been developed. First, it is the concept and the purpose of this study, which is *"from water to money basis"*. This simply means that the water amount taken from the Nile will bring economic improvements. Once the water amount to use is calculated and suggestions have been made, economic worth of these suggestions will be generated. Thus makes the approach of making the most money efficient situation from the water amount. This is what this study does.

The second term is *"water budget"*. This is the water amount to be used, in order words; optimized. There is an amount of water and this amount needs to be decided which area and how much to be used for. It is an important decision to make because it can alter the results significantly.

The Model

After gathering all information, it is now necessary to build a model to estimate the water levels at selected locations. And with the help of this model, it is possible to calculate water amounts at those selected locations. There are main measurement points, which show the current flow rate at that point. Between each point, water head changes due evaporation and precipitation can be calculated. Those locations are like in the figure below;

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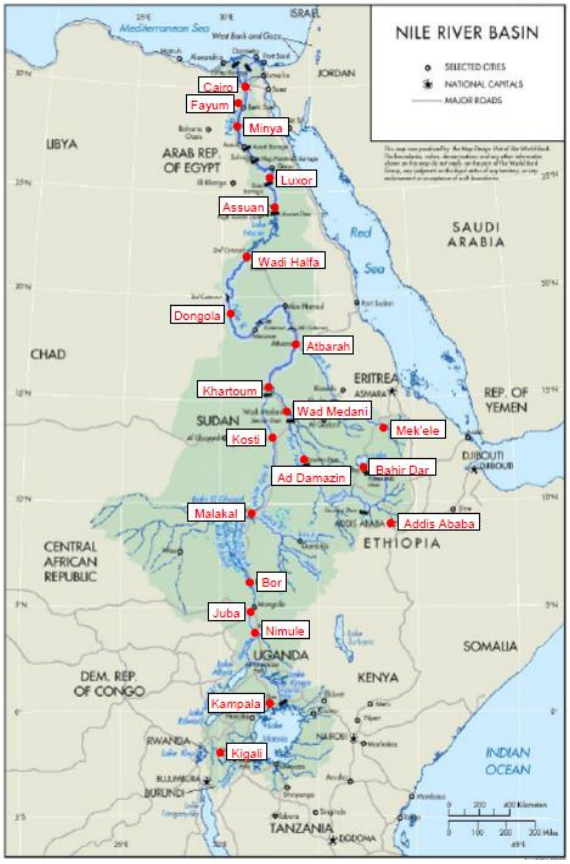

The model is developed by using MatLab program. It has main hydrological data of the river. The model has been developed to calculate water amount changes in mm. This means the change calculated is in water head. It is important to divide the river into segment, as many as the user wants, so that the user can work independently. Even though the model calculates the changes in mm, it is possible to calculate the changes in cubic meter from the water flow. An example is shown below;

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Assumptions:

- Q (total water amount): 100 m^3/year
- Segment amount: 5
- Water head changes (model results output):
  - Segment 1 to Segment 2: 100 mm decrease (0.1 m decrease)
  - Segment 2 to Segment 3: 80 mm decrease (0.08 m decrease)
  - Segment 3 to Segment 4: 60 mm decrease (0.06 m decrease)
  - Segment 4 to Segment 5: 20 mm decrease (0.02 m decrease)

Correlation:

At starting point (Segment 1), the water amount is x m^3/year

On the way to Segment 2, it decreases 0.1 m so the water amount at Segment 2 is (x - 0.1 m^3/year)

So the whole equation would be like below (each segment's calculation is highlighted);

$X + (X - 0.1) + ((X - 0.1) - 0.08) + (((X - 0.1) - 0.08) - 0.06) + (((X - 0.1) - 0.08) - 0.06) - 0.02) = 100$

By this correlation, X is supposed to be 20.16.

Segment 1: 20.16 m^3/year
Segment 2: 20.06 m^3/year
Segment 3: 19.98 m^3/year
Segment 4: 19.92 m^3/year
Segment 5: 19.90 m^3/year

} 100.02 m^3/year in total

Now that the information and water amount have been obtained, it is now the step for making suggestions and changes to have more lucrative, efficient and sustainable situations from water amounts, either for agricultural or energy production. Considering the scenarios will result in potential results and having the new water amounts, suggestions will be made to optimize the situation.

Scenarios

The decision to be made is very responsible so it is quite reasonable to use so-called "scenario method" to consider all types of problems and variants of situations might occur during the realization of the project. For that purpose, two major scenarios and three minor scenarios with their own specific parameters are designed. These scenarios are designed for energy and agriculture variants of water use. Minor scenarios are economic, political and environmental effects. These effects

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will be examined separately for each scenario. This is important to see the situation and obtaining results in a more concrete way.

As it was mentioned before the main data we need to use in every scenario is water amount. Once the current energy, agriculture, economic, political and environmental situations in each country are known and impacts of each scenario are calculated, it will be possible to observe the differences between the current situation and scenario results. This way, it will be possible to make suggestions in order to lower the negative impact or improve the situation even better. This is going to be the main methodology of this thesis, which aims to optimize the water use economic improvements regions.

In case the water is used in agricultural sector, the next step would be deciding which plant to invest. The factors affecting this choice depend on the demand in a specific crop. A crop's water demand and financial values are very important parameters. Knowing the market value of a crop will make it possible to compare the crops' prices with other countries' prices. This will provide a more conscious crop selection.

Water Need Calculations

In order to calculate the actual water need of a crop, a lot of parameters have to be known and calculated (total water need for all the crops = water for one crop multiplied for the total area in the country for this type of crops). The main parameters for an approximate estimation of a specific crop are; Crop evapotranspiration in mm/day and Single crop coefficients (Kc)

Evapotranspiration is the term coming from the words evaporation and transpiration and means the sum of these two parameters. This can be accepted as the loss of water of the plant, which needs to be balanced for the plant to grow.

Each plant has its own unique water demand coefficient (Kc). This coefficient can vary for the same crop under some conditions. These conditions are; climate and crop type and growth stage of the crop (fully grown crops need more water than newly planted ones because of the sizes, which means

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bigger size needs more water.

Information Found for each Country

Data	Unit	Egypt	Sudan	Ethiopia
Population	million	82,54	34,32	84,73
Total agricultural production	ton	79.586.160	9.623.503	31.815.855
Total withdrawal from the Nile	mil. m^3/day	187,12	74,58	15,23
Agricultural water withdrawal	mil. m^3/day	161,64	71,64	14,26
Total water used for agriculture	mil. m^3/day	169,40	740,40	431,89
Total electricty production	MW	146.795.000	7.842.000	4.980.000
Electricity from hydropower	MW	13.046.000	3.842.000	4.931.000

This table shows some basic results:

- Egypt has much higher agricultural production than other countries
- Egypt has much higher water withdrawal from the Nile and this affects the agricultural production.
- Ethiopia has much lesser water withdrawal and lesser water use for agriculture than Sudan but has more production. This shows that Sudan's agriculture is very inefficient and the land is very arid.

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- Hydropower is the main energy source for Ethiopia and Sudan.
- Ethiopia's agriculture and energy situation is extremely insufficient for the population.
- All countries use their water from the Nile mostly for agriculture.

Conclusions

Throughout this study, Egypt's, Sudan's and Ethiopia's water uses from the Nile and their effects have been widely examined. Each country has serious water scarcity, agricultural production amount and quality, energy production capacity, economy and political issues. In order to find solutions for these problems mentioned above, energy and agriculture situations of the countries have been researched and how they influenced economic, political and environmental situations. Once these impacts on current situation were calculated, suggestions have been made in order to ease the negative effects or improve the positive effects.

These suggestions have been made either to save money or make more profit. In other words, water amount changes have been managed in economic outcomes. So in other words we can consider the realization of this cooperation between the method of scenarios and mathematical models one of the ways to provide the best conclusion in difficult problematic situation and can recommend it to the governments of mentioned countries. In order to understand this whole concept, the following step by step scheme of the thesis is hoped to be found helpful and clear:

1. Information (above mentioned) about the countries are gathered.
2. Scenarios have been designed.

a. Agricultural scenario has been examined within its agricultural, economic and political consequences, if such scenario would occur.

b. Energy scenario has been examined within its energy,

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economic and political consequences, if such scenario would occur.

NOTE: Now it is known what we have and what may happen. We detect the problems and understand what is needed.

3. The model has been built and set up.

4. Water amounts for selected locations according to consequential changes in scenarios have been calculated.

NOTE: This water amount is the "water budget". It is now the time to make decisions to improve the situation.

5. Water budget is considered. Decisions and calculations are done according to the following points;

a. Increase agricultural production either with the current amount or with the new amount of water.

b. Increase specific agricultural products to lower their market value in the country or provide export income to the country.

c. Increase the water per capita amount.

d. Increase energy production

NOTE: These decisions can be changed due to specific interests and benefits of the country. This freedom is what makes this work very helpful and interesting. Based on this principle, the work done here can be applied to other countries. After these decisions made in the thesis, it is calculated that all three countries have much efficient agricultural or energy production, resulting in better life standards and increased Gross Domestic Product.

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SPATIAL AND TEMPORAL DYNAMIC OF CO_2 FLUXES IN BOG ECOSYSTEM IN THE SOUTHERN TAIGA REGION OF EUROPEAN RUSSIA

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Abstract: The article focuses on the impact of environmental factors on the absorption and emission of the carbon dioxide fluxes in European Russia peat bog.

Key words: carbon dioxide fluxes, greenhouse gases, boreal peat bogs.

One of the main climate change factors in the world is an increase in the concentration of atmospheric greenhouse gases, including CO_2, which plays a major role in this process [1, p.3]. According to this, in recent years researches which aimed at assessing the environmental factors that influence the spatial and temporal dynamics of the fluxes of greenhouse gas emission have become increasingly popular.

The boreal peat bogs are important ground carbon stocks. They determine the spatial and temporal changes in the balance of CO_2 in the atmosphere.

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There have been complex ecological and climate researches [2, 3, 4] since 1998, which include in recent years the periodic monitoring regime of the emission and absorption of CO2 between the ground cover and the atmosphere on the territory of the Central Forest State Nature Biosphere Reserve (Tver region, Nelidovo district) have been conducted. In 2015 the bog "Staroselsky moss" was selected as the main objects of observation [2, 3, 4].

The area of the peatland is 4.2 km^2. It refers to integrated convex oligotrophic hummock-hollow bogs. The composition of the bog formations is characterized by considerable heterogeneity. Mosaic of microlandscapes is formed mainly by sphagnum and grass. The vegetation cover is typical for bogs in southern taiga zone. The edges of the bog on the gentle slopes are occupied by the pine forest [5].

The measurements have been carried out at 27 points with 15 m along the 400 m length transect. Points 1, 2 and 27 are confined to herbaceous-sphagnum pine. Hummocks (p. 6, 10, 12, 14, 17) are mainly represented by shrub-sphagnum vegetation. In hollows (p. 7, 11, 13, 16, 24) the grass grows basically. The peat surface of a bog (p. 4, 9, 19, 26) is covered with herbaceous-sphagnum vegetation.

The chamber method has been used for measurements of CO_2 fluxes intensity which were determined by the registration of changes in concentrations of this gas within the chamber. [6, p 8]. Infrared CO_2 gas analyzer Li-840 (Li-Cor Inc., USA), has been connected to the plexiglas hemispherical chamber with a temperature sensor inside. Diameter of the chamber is 30 cm, height is 15 cm. The chamber is installed on the collar, embedded in the soil at 35 cm. Data on the concentration of carbon dioxide comes every second to the computer connected to the gas analyzer and recorded in a special data file. Measurements carried out twice on each point of 200 seconds from the transparent chamber (for measuring net ecosystem exchange) and the dark chamber (for measuring ecosystem respiration). Exponential

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function has been used for CO_2 fluxes calculation. The observations were conducted once every 7-9 days. At the same time we measured the soil temperature at a depth of 10 cm, and the air temperature with a thermometer Hanna Checktemp 1 (HANNA instruments, USA), also the total biomass of sphagnum, shrubs and grasses has been measured on each point.

The calculation of local fluxes of greenhouse gases from the soil cover becomes a final result.

The components of the balance of carbon dioxide:

NEE (net ecosystem exchange) - pure ecosystem exchange of CO_2 in the atmosphere (transparent chamber).

Re (ecosystem respiration) - ecosystem respiration, which includes a set of microbial, root respiration and breathing above-ground parts of plants (dark chamber).

GPP (Gross Primary Production) - absorbance (deposition) of CO_2 by plants to produce primary products.

NEE = Re – GPP

GPP = Re – NEE [7]

Results:

The spatial dynamics of fluxes and the balance of CO_2 in the bog:

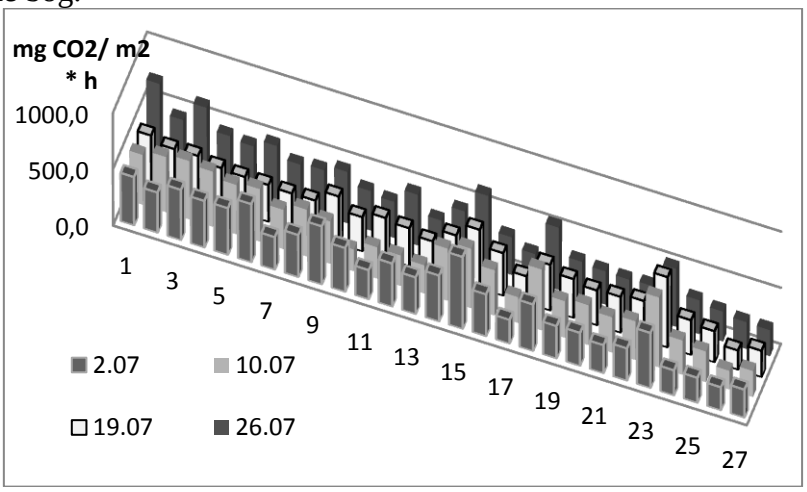

Figure 1: Spatial dynamic of Ecosystem Respiration

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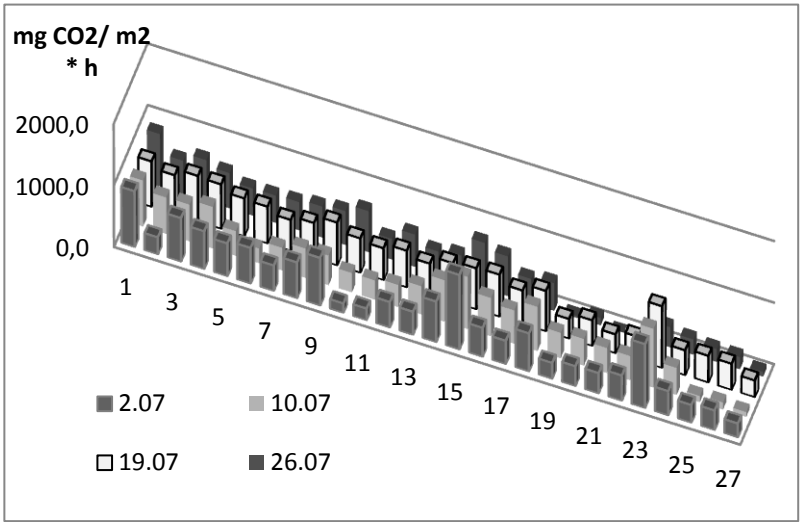

Figure 2: Spatial dynamic of Gross Primary Production

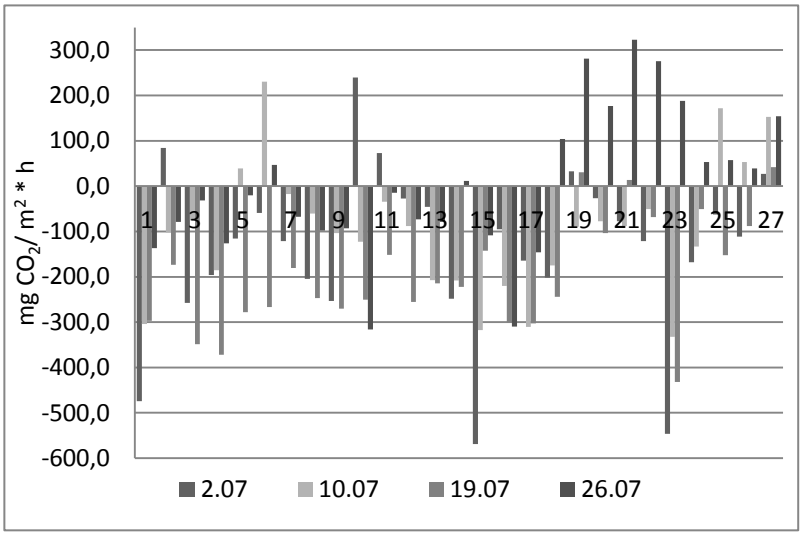

Figure 3: Spatial dynamic of Net Ecosystem Exchange

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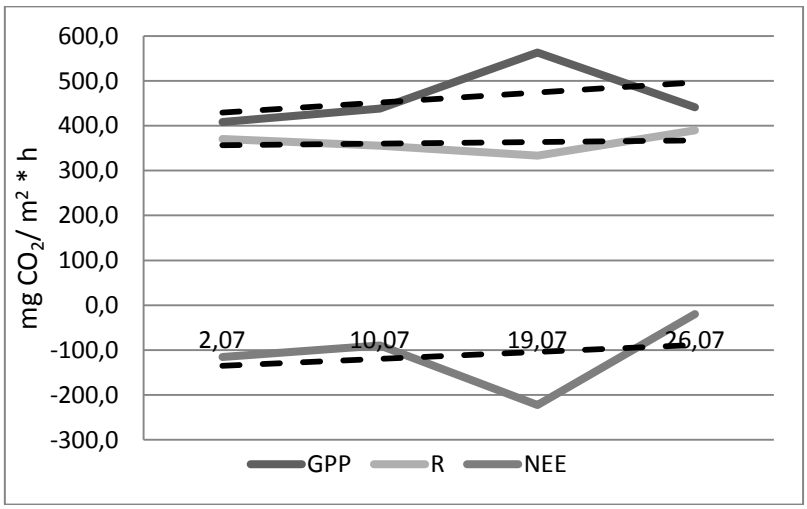

Figure 4: Temporal dynamic of CO_2 fluxes during July

The temporal dynamics of environmental factors:

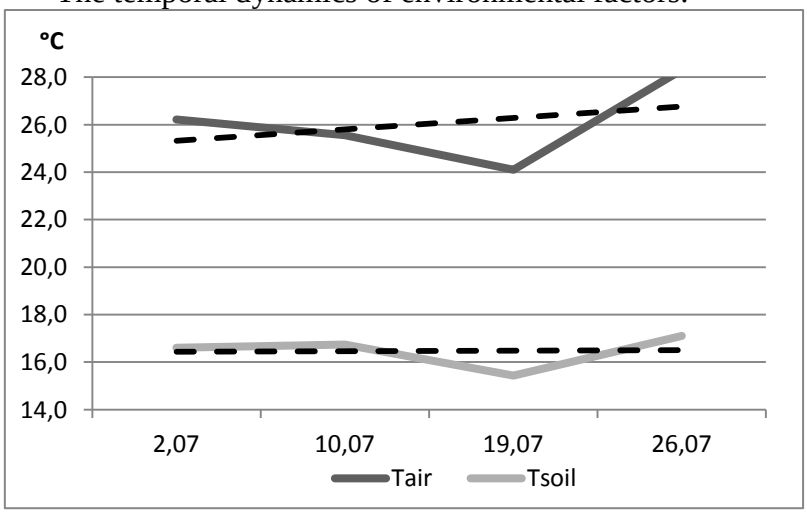

Figure 4: Temporal dynamic of air and soil temperatures during July

The following factors that affected the CO_2 fluxes largely from the ground cover of bogs were identified as a result of the

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research. One of the major factors is the temperature of the soil. Raising the temperature provokes an increase of the ecosystem respiration. It is determined by the activity of microorganisms, root respiration, physical and chemical processes in the peat. Biomass also affects the CO_2 flux. When the mass of grass vegetation rises, negative balance of CO_2 between the atmosphere and the ground surface also increases. The grass adsorbs carbon dioxide actively during photosynthesis.

Throughout the transect on the hummock-sites where the low levels of ground water are, the soil is warmed better, carbon dioxide emissions proceed actively. In the hollows, where a high level of ground water prevents drying of peat moss, deposition of carbon dioxide was more intensive.

In July due to the growth of the average soil and air temperature and the prolonged drought activity absorption and emissions were increased, balance of CO_2 was aspired to the positive direction.

It should be noted that on July 19 due to short-term lowering of temperature the activity of emissions decreased and deposition increased. In the second case, the temperature approached the optimal value. This shows a significant effect of temperature on the life of plants and microorganisms and their contribution to the overall carbon balance in the bog.

On the base of these results, we can conclude that the observed part of the bog was a basic carbon sink in July 2015.

These studies will help identify the basic mechanisms of the dynamics and development of bogs, as well as their resistance to external impacts. The indicators of the variability of CO_2 and H_2O exchanges also determine the state of bog ecosystems and can be used to solve the problems of planning and management of natural resources.

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STUDY OF IODINE DISTRIBUTION IN SOILS, PLANTS AND WATER IN ORDER TO EVALUATE THE STATUS OF IODINE IN MONGOLIA

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Abstract: Iodine is a biologically essential trace element that plays a significant role in the functioning of the thyroid gland. More than 80 % of Mongolia's population suffers iodine deficiency. The aim of this study is to study the effects of stable iodine in natural waters and rocks and soils with geochemical features of the local landscape, on the morbidity of residents with endemic goiter and other non-malignant diseases. In the summer of 2015 samples from water, soils and cut grasses were taken in order to determine the iodine content. It is proven that there is no direct relationship between the numbers of disease incidents with percentage covered with iodine prevention.

Key words: iodine, thyroid gland, endemic goiter, drinking water, soils, grasses, Mongolia, Ulaanbaatar

Iodine is a biologically essential trace element that plays a significant role in the functioning of the thyroid gland. Its low content in the environment or insufficient intake in the body cause spread of diseases, especially endemic goiter, in animals and humans [1, p. 65; 3, p. 771-772; 4, p. 1224]. In addition, a chronic deficiency of iodine in the human body is often the hidden cause of many diseases.

Iodine deficiency is a global problem of modern society. According to W.H.O data, about 2 billion people on all continents of the globe live in conditions with iodine deficiency, including more than 80% of Mongolia’s population [6].The “Prevention of iodine deficiency” program carried out by the government of Mongolia since 1996 yields its results as shown in table. №1:

From 2001 to 2004 the spread of endemic goiter has decreased from 21.4% to 13.8 % [5]. However, the problem is not completely solved. As shown in table. №1, two Central areas (Khubsugul and Arkhangai) and in the Western district, Zavkhan, are have the highest rates of morbidity in humans and animals, despite the ongoing prevention.

Table 1 Distribution of endemic goiter and iodized salt by region 2004 [7, p. 202]

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The name of the region	The distribution of endemic goiter %	Iodized salt by region %	The distribution of goiter in animals %
Khubsugul	25,60%	54,80%	33%
Zavkhan	21,70%	61,90%	11,60%
Arkhangai	20%	63,50%	20%

The situation is very complicated and in Ulaanbaatar. In spite of high official rates of iodine prophylax (95,9%) and low prevalence of goiter in domestic animals (0,2%), the endemic goiter is 12.5% of the population. This is much higher than the most other regions of Mongolia, where iodine prophylaxis is given much less importance. This may be due to quite contrasting living conditions of the population of the capital of Mongolia. 55% of Ulanbaators population lives in private homes and yurts, the remaining 45 % in apartment blocks with centralized sewer and water service. The intakes for the water service are located in 4 different places (from various aquifers). The population with no connection to water service system uses water from 170 ponds and about 5000 wells [3, 6].

As you know, studding the spatial regularities of distribution of iodine in the food chain allows reasonable prevention of diseases among the local population.

The possibility of spatial assessment of iodine status in territories contaminated with radioactive isotopes is based on the combination of experimental data on iodine content in soils, soil maps and cortometrajes calculations [2, p. 156]. Therefore, the aim of this study is to study the effects of stable iodine in natural waters and rocks and soils with geochemical features of the local landscape, on the morbidity of residents with endemic goiter and other non-malignant diseases.

In the period of 2015-2016 the following tasks will be solved:

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1. The analysis of literary and cartographic data on the effect of deficiency of stable iodine, on morbidity of Mongolians by thyroid diseases.

2. Sampling of drinking water from various sources of Ulan Bator, as well as soil and grass in grazing area of cattle (The meat of domestic animals is main source of food for most of the local population).

3. Determining the content of stable iodine in potable waters, soils and grass.

4. The analysis of the data combined with medical data on districts of Ulaanbaatar.

The work will take into account the fact that on the territory of Ulaanbaatar, as like as other large cities, soil and natural waters are affected by anthropogenic impact. The main sources of pollution are thermal power plants and stoves in aglomeration (the Ger districts), and also a large number of cars and gas stations, household waste and household garbage. All of this can effect on migrate of iodine in the food chain and the health of the population.

Currently the first two tasks are fully implemented. The analysis of literary sources showed that despite the positive effect of the use of iodized salt in iodine-deficient regions of Mongolia (1996 – 2010), the direct relationship between the number of cases and percentage of households in the aimaks (regions) covered with iodine prophylaxis is not observed. This may be explained by geochemical peculiarities of the local landscape.

As a result of the field research, we selected 15 samples of potable waters from four districts of Ulaanbaatar, including water from wells in the Ger districts. Soil and herb samples were taken form “Terelj Natural Park” and directly from the pastures within the city limits. Soil samples were taken by converting methods – the average of the five sample points from the area of one meter square; with a depth of no more than 10 cm. Hay of harvest herbs were taken from the same area. All sampling sites were linked by GPS.

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Thus, in the period of 2015 – 2016 it is expected to obtain data on the content of iodine in drinking waters and the lower links of the trophic chain: soil – vegetation – cow – meat/milk – humans. Analysis of the obtained results in combination with medical data on districts of Ulaanbaatar will contribute to a more rational and effective iodine prevention from endemic goiter diseases of Mongolians. The work was supported by the Department of Biogeochemistry of Environment of the Institute of Geochemistry RAS (Moscow).

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ECOLOGICAL ASPECTS OF STRAY DOG DWELLING IN A MEGAPOLIS

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Abstract: The environmental aspects of stray dogs dwelling in Moscow were studied to show a serious wildlife disturbance, epizootic danger, and attacks on people in the city. The approaches to solving the problem were proposed.

Key words: stray dogs, free-roaming dogs, OSR method, stray dogs' population control.

Many of canines (foxes, jackals, coyotes, wolves) are inclined to a sinantropization. This tendency helped the domestication of a dog in one time. Therefore domestic dogs as specie have no biological or psychological limiters for transition to a sinantropic way of life. This way of living is natural for them, and the greater part of dogs can survive without people with enough food. But people can't accept that, especially in megalopolis residential areas [1].

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The populations of city stray dogs have never been stable, as well as there was no continuous growth. In the 19th century the number of stray dogs was small in the large cities, Moscow, St. Petersburg, etc. Each janitor had the responsibility to liquidate free-roaming and feral dogs at the subordinated territory [2].

After the First and the Second World Wars highs of stray dogs' population were observed because there was dogs' inflow from the destroyed suburbs and villages [2].

The number of stray dogs increased in 60-70th years of the 20th century after outflow of the human population from villages and their moving to the cities and suburban zones. With moving to the cities, people got opportunity to acquire a thoroughbred dog. Such dogs were bred only within clubs. Cultivation of thoroughbred dogs was planned thus people waited for their turn to buy a puppy. Therefore, the level of cynological knowledge among owners of thoroughbred dogs was rather high. At this time fight against stray dogs was the responsibility of the state, the number of animals was rigidly controlled [3].

The numbers of owners of thoroughbred dogs increased significantly. A large number of dogs, including unknown breeds in Russia, were imported to the country from abroad. Many of them came by accident. In the period of welfare decrease the number of dogs, including thoroughbred, which were left out on streets, was higher than ever. The biggest number of thoroughbred dogs perished on the streets at once literally. Survival and adaptation without humans was possible only for breeds, whose initial shape and structure were less changed by the human. The situation was complicated by the fact of proceeded village's emptiness. The state control over the number of stray dogs was lost.

The food resources for packs of stray dogs in the city are a food waste. The pack's territory usually includes the power supplies places. Such places can be suburbs where dumps or waste household platforms or warehouses are located. Dogs often gather near shops, dining rooms, markets, etc. There is always a

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hierarchical structure in pack of dogs, dominants protect their territory against intruders, but can get on with newcomers. It is necessary to mention that packs of stray dogs chose the periphery of the city instead of city's center where it is more difficult to find a forage and shelter [4, 5].

In other words, stray dogs as sinantropic animals live in the impoverished anthropogenous ecosystems and oppose to preservation of natural areas in the city. The stray dogs in contrast to the feral dogs aren't predators, but eat waste of the human. But environmental niche is occupied by protected species– foxes, varies, polecats and other animals. Stray dogs are a serious wildlife disturbance for such urban habitants like elks, boars, predatory and songbirds, hares, squirrels, ermines, varies, hedgehogs, lizards, snakes, frogs, etc. Most of these types are threatened and protected species under the threat of disappearance in Moscow and are included to the Red List of Moscow [2, 3]. Animals stop reproduction or leave their habitats if they can. And, as we know, the ecosystem is stronger the more species it includes. So extinction and migration of wild fauna undermine a condition of a city ecosystem.

Residents of megalopolises should distinguish the concepts "nature protection" and "zooprotection". A mission of "nature protection" is preservation of rare plants and animals' species and their habitat. Zooprotection has nothing common with nature conservation. Its field of work must include the fight against cruelty to animals, abuse of rights of their owners, search and relocation of lost animals, etc. That's why the nature protection and zooprotection are different systems of animals handling sites of, in the first case – wild, in the second – home, and they shouldn't overlap and disturb each other in any way [2, 3].

The ***epizootic aspect***. The unwished finding of a big number of stray dogs in the city leads to the spread of diseases dangerous for humans as well as for wild animals (rabies, leptospirosis, brucellosis, salmonellosis, tulyaremiya, plague, helminthosis, etc) [6, 7].

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Instead of epizootic danger of stray dogs, there is a serious dangerous of their *attacks on people*. Generally dogs attack those who are afraid of them extremely, recognizing people behavior and body language of people. Dogs often attack people, who differ from others: the elderly people, the children, unusually dressed, loudly talking, gesticulating and drunk people, etc. Dogs usually attack quickly moving people too– runners, cyclists, and skiers, even attacks on drivers are frequent. Attacks on the dogs going with their owner are widespread [3].

That is important to note that the sterilized dogs and don't lose the territory aggression. As a result of sterilization and castration, dogs change only elements of sexual behavior, but not elements of protection of their territory. Carrying out sterilization of the dogs will be effective only for limited dog's quantity having conditional owners or trustees (the organizations or institutions which are responsible for dogs, for ex. parking) [2].

The *psychological aspect*. The stray dogs are the reason of conflicts between their opponents and defenders. Stray dogs often provoke cruel attitude to themselves. The trustees giving houseroom for animals in the density conditions have no knowledge and experience of that. The people, who lure dogs on the street, but never treat their diseases, do not solve a problem, but also endanger people around themselves and cause negative attitude to dogs [8].

As it was told above, the *nature protection aspect* reveals incompatibility of the conservations efforts and wild species in case of living stray dogs in megalopolises.

The legal aspect includes human rights on safety and health. It concerns presence of stray dogs on city streets, and dog hunters' activity, who fight the human rights on property, safety and health [8]. The hunters' activity is often fatal for domestic dogs and even for dog keepers. Poisoned baits are used without care about the harm for wild animals.

The standard aspect is in improvement of the legislation in the field of the treatment of neglected animals in the city,

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development of sanitary standards and rules of catching and the maintenance of vagrant animals [9]. That must include also creation of standard meeting specialized supervising authorities in each area, responsible for performance in the subordinated territory. The common city database is necessary for tracking of homeless animal's number and the reporting of shelters and specialized affiliated bodies.

The problem of homeless animals in Moscow is a complex challenge for city authorities, who should, taking into account all the aspects of dogs' life in the city, create the program to prevent the neglected animals' presence on city streets without care and nurturance. Such a program wouldn't allow the animal abuse both on city streets, and in city shelters. Of course, it takes a long time. Abiding the next principles we can find a solution of problem of stray dogs in the city:

- improvement of the legislative base regulating matters of the domestic and stray dogs management, creation and maintenance of state and private shelters in Moscow, control of performance of these norms;
- creation of necessary quantity of shelters for animals, strengthening of public control of their activity;
- introduction of new technologies of garbage collection (collecting of waste in the closed containers, liquidation of illegal dumps, timely removal of waste from accumulation places);
- solving a problem of overproduction of pets (the program of sterilization domestic thoroughbred and purebred dogs without of genetic value for breed);
- creation of professional municipal control of number and the maintenance of the homeless animals services coordinating this activity in all city scale;
- using humane approaches of stray dogs number reduction;
- ban for stray dogs feeding, imposition of penalties;

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- taxes increase for large dogs owners, penalties for free-running dogs owners;
- taxes cut for sterilized animals owners;
- cultural dog breeding development among the population (to increase a quantity of playing and training grounds, repair of outdated platforms, development and promotion of sport with dogs, participation and teaching children to treat dogs properly);
- promotion among the population of "adoption" of an animal from a shelter;
- promotion of preservation of natural territories, wild types and their habitat in the city;

The city program for neglected and vagrant animals which realizes the work on catching, treatment and the contents in shelters of vagrant animals, and also search new owners for them would be an ideal option for Moscow. And it is necessary to add the prevention measures of pets overproduction.

It is clear that there won't be enough places in shelters for all stray dogs in the city. By different estimates the numbers of them differ from 10 to 100 thousand! In this case, it is necessary to understand that all caught animals can't be kept in shelters for life. It is necessary to release the wildest, the aggressive, incurably sick and suffering animals from an illness suffering, stress from the person and other dogs presence or the keeping into pounds with humane methods [10]. This aspect of the treatment of animals has to be controlled rigidly; differently the purpose of rescue of animals from streets where they are compelled to survive daily, fighting against hunger and diseases, has no humane idea as itself.

To clarify the impossibility of leaving all animals which are on the streets now, we will show the most effective, in our opinion, example of the animal treatment in the western countries. The main form of work with neglected and homeless animals there are the unreturnable catching and the

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accommodation them at municipal shelters. Shelters are also acceptable for the pet who became unnecessary, they fend the masters off from the booting them out where they can undergo various dangers. After the given expectation period or after search for a dogs' or a cats' owner, former or new, the animal can be transferred to a public shelter for further accomodation. Putting down too sick, aggressive or unclaimed ones is a necessary measure, as municipal open-admission shelters would preserve capacity and places for receipt of new animals. The largest zooprotective organizations (WSPA, HSUS, and PETA) agree that it is more humane to put an animal down, than to leave it on the street, to pump the probable early and heavy death. There are also limited-admission shelters stopping receipt the animals if all the seats are occupied. These are shelters of the organizations which dismiss a possibility to put the healthy animals down [10, 11].

The important preventive measure is to decrease the number of stray dogs and, therefore, mercy killing amount in shelters, is prevention of pets' reproduction. It can be reached by decrease in taxes for owners of the sterilized animals, for needy owners – free sterilization of their animals. Only the licensed factory owners can keep unsterile animals in case of paying taxes for the right to be engaged in this activity [12].

The OSR method "catching/sterilization/return" ("trap/neuter/release" or "trap/alter/return") it is applied sometimes as a temporary regulation measures for cats which are under the care of the fully responsible people. As for dogs we should allow this method in case if an individual or the legal body undertakes the sterilization of "regulated" dogs, legally fixed the status of these dogs as possessory and keep them on the fenced site in good housing conditions [2, 3].

It is impossible to forget such important measure as reduction of food supply – waste, available to animals (dogs, cats, crows and rodents) all year round in a constant quantity. To prevent the animals' accessibility to rubbish, methods of

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preventing for their physical entry into garbage containers are necessary. Container lid or intake waste packing platform could be good decision. These measures will not be efficient in case if the number of unauthorized dumps remains at the present level.

Thus, for the stray dogs' problem solution in Moscow, it is necessary to follow the complex and multilateral policy, directed not only to removal of dogs from an urban environment, but to increase of dog culture among city population and creation the system of municipal and private shelters, specialized services for control of number and the homeless animals handling and coordinating this activity in scales of all city. Ensuring supervision over implementation of all stages of the treatment of homeless animals in the city, and also control over the treatment of pets and due care are highly important.

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COMPARISON OF METHODOLOGIES FOR THE DEFINITION OF WASTE HAZARD CLASS

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Abstract: Pollution of the environment exists everywhere in the modern world and there is need to control this situation. Determination of class of danger of soil as waste is a necessary condition for enterprises, in order to ensure safety of public life and health.

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Key words: class of hazardous waste, the concentration of the substance, dangerous substance, toxic waste.

There are several ways to determine the class of hazardous waste. This article considers two Russian methodologies.

Objective: To compare the methodological approaches to the definition of the class of hazardous waste on the example of the state of soil pollution.

Background concentrations of pollutants in the soil used in the calculations made in accordance with the regional background concentrations.

During the study the calculation of soil class of danger (as waste) was compared by two different methods:

- according to the order of the RF Ministry of Natural Resources on June 15, 2001 N 511 - "Criteria for classifying hazardous waste classified as dangerous for the environment"
- according to the Decree of 16 June 2003. N 144 - "On introduction of the SR 2.1.7.1386-03" - "Sanitary Regulations for determining class of danger of toxic wastes of production and consumption. 2.1.7. The soil, cleaning of residential areas, waste production and consumption. "

The calculation of class of danger of soil as waste according to the order of the RF Ministry of Natural Resources on June 15, 2001 N 511 - "Criteria for classifying hazardous waste classified as dangerous for the environment."

Hazard waste established by the degree of the possible harmful effects on the environment the direct or indirect effects of hazardous wastes on it in accordance with the criteria given in Table 1. [4]

Allocation of waste is classified as dangerous for the OPS calculation method is carried out on the basis of the index (K) characterizing the degree of hazardous waste at its impact on OPS, calculated on the sum of the dangers of substances that constitute waste (waste components) for OPS.

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List of waste components and their quantitative content are installed on the composition of raw materials and the technological means of its processing or the results of quantitative chemical analysis.

Table 1

N	The degree of the harmful effects hazardous waste on the environment	The criteria for classification of hazardous waste to a hazard class for the environment	Class of hazard waste for the environment
1.	Very high	The ecological system is irreversibly damaged, there is no recovery	I Class extremely dangerous
2.	High	The ecological system strongly damaged. The recovery period not less than 30 years after the complete removal of the source of harmful effects	II Class highly dangerous
3.	Medium	The ecological system is damaged. The recovery period not less than 10 years after the reduction of the harmful effects of an existing source	class III moderately hazardous
4.	Low	The ecological system is damaged. Self-healing period of not less than 3 years	class IV low hazard
5.	Very Low	The ecological system is almost not damaged	class V almost non-hazardous

The exponent of the hazardous components of waste (K_i) is calculated as the ratio of the concentrations of waste components (C_i) with a coefficient of its degree of danger for environment (W_i); the coefficient of the hazard for the components of the waste environment is a conditional parameter, numerically equal to the number of components of the waste, below the value which it does not have negative impacts on the environment. The

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dimension of the hazard ratio for environment conventionally adopted as mg / kg.

To determine the coefficient of the degree of danger component of the waste for environment for each component of the waste we established a degree of danger to the environment for a variety of environments in accordance with the methodology table. [4]

The list of parameters used for calculating Wi, includes indicators provide information to account for the lack of information on the primary indicators of the degree of danger waste components for environment.

The index information provision is calculated by dividing the number of established parameters (n) by 12 (N - number of the most significant components of the primary indicators of the danger of waste for environment).

Rating is assigned in the following ranges of variation of the information supply: <0,5 (n <6) = 1, 0,5-0,7 (n = 6-8) = 2, 0,71-0,9 (n = 9- 10) 3 =,> 0.9 (n> 11) = 4.

By establishing the degree of danger of waste components for environment in various environmental media parameter is calculated relative danger of waste components for environment (X_i) dividing the sum of rating for all parameters in the number of these parameters.

Coefficient Wi calculated by one of the following formulas [4]:

$$lgW_i = 4 - 4/Z_i ; \qquad \text{For} \quad 1 < Z_i\_i < 2$$

$$lgW_i = Z_i ; \qquad \text{For} \quad 2 < Z_i < 4$$

$$lgW_i = 2+4/(6 - Z_i), \qquad \text{For} \quad 4 < Z_i < 5$$

where $Z_i = 4X_i /3-1/3.$

Coefficients (XI, ZI, Lg WI, Wi) for the most common components dangerous waste are calculated and presented in the

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table in Annex 2 of the Order of the RF Ministry of Natural Resources on June 15, 2001 N 511.

The exponent of the dangerous components of waste for the environment is calculated using the formula: Ki = Ci / Wi, where Ci - concentration of the i-th component of hazardous waste (mg / kg of waste);

Wi - the coefficient of the degree of danger i-component of hazardous waste for the environment (mg / kg).

The exponent of hazardous waste for the environment K is calculated by the following formula: K = K1 + K2 + ... + Rn, where K - an indicator of the degree of hazardous waste for the environment; K1, K2, ... Rn - indicators of the degree of danger of the individual components of hazardous waste for the environment.

Allocation of the waste to the hazard class by calculation in terms of the degree of hazardous waste for environment is carried out in accordance with: 10 (6)> = K> 10 (4) - I; 10 (4)> K => 10 (3) - II; 10 (3)> K => 10 (2) - III; 10 (2)> K => 10 - IV; K <= 10 - V.

This methodology by order of the RF Ministry of Natural Resources on June 15, 2001 N 511, is the most relevant, accurate and detailed.

The calculation of the hazard class of soil as waste in accordance with the Resolution of 16 June 2003. N 144 - "On introduction of the SR 2.1.7.1386-03" - "Sanitary rules for determining the hazard class of toxic wastes of production and consumption. 2.1.7. The soil, cleaning of populated areas, waste production and consumption. "

The degrees of exposure of waste on the environment and human health in this methodology are divided into four classes of danger [3]: 1 class - extremely dangerous; 2 class - highly dangerous; Class 3 - moderately dangerous; Grade 4 - a little dangerous.

Waste composition is determined by the manufacturer (owner) waste on their own or with the assistance of accredited

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organizations. The relative content of each component in the total mass of waste Ci (in%) should be an upper limit of the content of this component in the total mass of waste, i.e. comply with to the term "no more." Amount values Ci for all the components which make up waste, should be close to 100%, but not less than 95%.

Classification of waste classified as dangerous by the calculation method on the basis the value of of the total hazard index K, calculated by the sum of the danger of substances that constitute waste (Ki).

Indications of danger waste components Ki is calculated as the ratio of the concentration of waste components Ci (mg / kg) and the coefficient of the hazard component of Wi. [3]

$$Ki = Ci/Wi \quad (1)$$

$$\lg Wi = 1{,}2\,(Xi - 1), \text{ where} \quad (2)$$

Xi - averaged parameter the dangerous components waste.

The algorithm for determining the averaged parameter the dangerous components waste Xi:

• On the basis of the qualitative composition of the waste is conducted toxicological information retrieval, sanitary and physico-chemical indicators danger of each of its components. Indications of danger are selected from the list in Annex 2 SR 2.1.7.1386-03 - Table 10, and their values of the normative documents and literature.

According to the value of the index danger of last assigned a score between 1 and 4 (in accordance with Annex 2 SR 2.1.7.1386-03).

• In calculating Xi is considered information the component I, which depends on the number of indicators and has the following meaning (in rating): I = 4 for n - 12 - 11; I when n = 3 - 10 - 9; I with n = 2 - 8 - 7; I = 1 for n <= 6.

• Average setting the dangerous components waste Xi is calculated by dividing the sum of scores for all indicators, including information on the total number of indicators.

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- If there is a waste substances, products with a proven human carcinogen waste this component is set to Wi = 1, all other indicators are not taken into account danger of, i.e.

Ki = Ci /1 = Ci.

• The total index of danger from K is equal to the sum of all components Ki waste:

K = SUM Ki = K1 + K2 + K3 + Kn.

• Ranking waste of hazard classes of K value is carried out in accordance with: K> 50000 - 1; 50000-1000 K = - 2; = 999-100 K - 3, K <100 - 4.

As a result, the comparison of two methods revealed no perfection in technique SR 2.1.7.1386-03 - for example, if you change the parameters of the amount of balls and the number of parameters are equal then XI (average option danger of component of the waste) is not changed, and consequently it is not true ; Also, if all indicators 1 hazard class, the amount of rating equal to the number of indicators and XI = 1, the substance is not that dangerous, but by Ki (an indicator of hazardous substances) it is not true.

Also the calculation considers the natural components of the soil, and because of its content (concentration) is high, even if the assignment of the safe class, it has a big impact on rate class of danger according to this method of calculation. It has been obtained that the content of the natural component is large, compared with the content of other chemical substances, and the hazard class is determined by the natural ingredients and the results are understated, that's not true.

Methods MNR dated June 15, 2001 N 511 allow you to make more accurate calculations and minimize errors. Coefficient degree of danger component of the waste (Wi) is calculated differently based on calculated for each case factor (Zi), which allows results to be more reliable. But the technique of the MNR of June 15, 2001 N 511 has its defects and needs improvement.

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Костылева Л. Н.

ОЦЕНКА ВОЗДЕЙСТВИЯ ПРОМЫШЛЕННЫХ ВЫБРОСОВ НА ЗДОРОВЬЕ НАСЕЛЕНИЯ

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Аннотация: Выявлены экологические факторы риска для здоровья населения промышленного города. Проведенная оценка воздействия антропогенных выбросов в атмосферный воздух позволила ранжировать территорию города по степени опасности для здоровья населения.

Ключевые слова: окружающая среда, атмосферный воздух, здоровье населения, загрязнение.

Abstract: Identified environmental risk factors for health of population in industrial cities. An evaluation of the impact of anthropogenic emissions into the atmospheric air allowed to rank the city on the degree of danger to the health of the population.

Key words: environment, air, health, pollution.

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Процессы формирования общественного здоровья вполне объективно отражают социальную среду жизнедеятельности и в определенной мере характеризуют состояние окружающей среды конкретного региона. Вместе с природными факторами на окружающую среду влияют также и антропогенные изменения. Основными источниками антропогенного загрязнения атмосферного воздуха являются автомобильный транспорт и промышленные предприятия [1].

Целью исследования являлось построение статистических моделей влияния загрязняющих веществ, распространяемых с потоком воздуха, на уровень заболеваемости населения, обусловленных загрязнением атмосферного воздуха.

На примере г. Воронежа, были проведены эколого-гигиенические исследования с целью выявления экологических факторов риска для здоровья населения. Основу работы составили материалы Центра госсанэпиднадзора в г. Воронеже за последние пять лет, а также были использованы данные других ведомств. Исследование включало следующие этапы: 1) оценка эколого-гигиенической ситуации и состояния здоровья населения по предварительно выделенным наиболее информативным показателям; 2) выявление причинно-следственных связей в системе «загрязнение атмосферного воздуха - заболеваемость населения»; 3) оценка вклада антропогенной нагрузки в формирование заболеваемости населения на основе статистических методов.

С целью достоверной оценки риска здоровью населения система мониторинга загрязнителей атмосферного воздуха была переориентирована с определения максимально-разовых концентраций на среднесуточные. Формирование баз данных по факторам среды проведено индивидуально по каждому району с их стандартизацией по соответствующим территориальным единицам (зонам обслуживания поликлиник). Основным параметром качества среды

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являлись средние концентрации загрязнителей атмосферного воздуха (мг/м^3).

Для оценки степени функциональных связей между качеством среды обитания и состоянием общественного здоровья использованы методы стандартного математико-статистического анализа и моделирования в форме корреляционно-регрессионного анализа, широко применяющиеся в эколого-гигиенических исследованиях [2]. Их применение основано на сопряженном анализе стандартизированных критериев здоровья и каждой из групп факторов риска, включенных в исследование.

На последующем этапе учитывали лишь статистически достоверные корреляции ($n = 50$, $T_{расч} > T_{табл.}$, $p = 0,05$).

Основными загрязняющими атмосферный воздух веществами на протяжении последних лет являются сернистый ангидрид, на долю которого приходится 25% от общего объема выбросов, оксид углерода и диоксид азота - по 24,5%, пыль неорганическая – 17%.

По данным исследования отмечается высокий уровень общей заболеваемости взрослого населения г. Воронежа (примерно 10%). Параметры атмосферного загрязнения среды города вызывают наиболее существенный «отклик» со стороны болезней органов дыхания, болезней нервной системы и органов чувств, болезней кожи.

Ведущий вклад загрязнения атмосферного воздуха вносит в суммарную заболеваемость детей (примерно 40%), особенно, в заболеваемость органов дыхания (62%), далее следуют болезни кожи (12%), нервной системы и органов чувств (10%).

Статистический анализ в системе «атмосферный воздух - здоровье детей» показал достаточно высокую общую информативность выбранного комплекса факторов среды: около одной трети корреляционных моделей (37%) оказались значимыми, т.е. колебались в диапазоне корреляций средней и сильной степени.

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Несмотря на имеющиеся в литературе данные об умеренном и относительно низком загрязнении воздушного бассейна города Воронежа в сравнении с другими промышленными регионами, наличие многочисленных приземных источников вредных выбросов, высокая автотранспортная загруженность ряда городских магистралей создают потенциальную угрозу здоровью населения в связи с локальным, но опасным загрязнением воздушной среды.

Наиболее благополучными районами города, как показывают исследования, считаются относительно «молодые» преимущественно высоко этажные жилые районы; районы, расположенные на удалении от промышленных зон; районы, характеризующиеся высокой степенью озеленения; районы, в которых наблюдается умеренная транспортная нагрузка на среду.

Наиболее экологически неблагополучной территорией является промышленная зона Левобережного района, ограниченная Чернавским и Вогрэсовским мостами, а также часть Ленинского административного района города.

Проведенная оценка воздействия промышленных выбросов в атмосферный воздух позволила ранжировать территорию города по степени опасности для здоровья населения и предназначена для дальнейшего развития систем экологического и социально-гигиенического мониторинга, планирования природоохранных мероприятий.

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THE CARBON DIOXIDE EMISSIONS DYNAMICS AS A MARKER OF THE ENERGY INDUSTRY ECOLOGICAL AND ECONOMIC DEVELOPMENT IN CHINA

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Abstract: In the article the fuel and energy complex status of China is discussed. The energy consumption analysis in China based on the carbon intensity index is done. The growth rates of CO_2 emissions during the last decades are calculated.

Key words: energy consumption, consumption of energy from fossil fuels, carbon dioxide, power-generating sector, and carbon intensity.

The coal always has been the dominant in the power balance structure of China. It has been followed by hydropower, oil and nuclear power. Coal deposits are concentrated mainly in the northern and north-eastern regions (only in Shanxi province about a quarter of all coal extraction is mined). Huainan, Hegang, Kailuan, Datong, Fushun, Fuxin can be marked among the largest coal output centers. Moreover, lots of small deposits are scattered over the whole country and about a half of all coal is extracted by 11 000 little coal pits.

Recently, geologists have calculated the total coal reserves in China, it is nearly 1 trillion tons (860 milliard tons of hard coal and 130 milliard tons of brown coal). Although, bigger amounts have been predicted, for example, the reasonably assured resources of coal are estimated as 115 milliard tons. In China there are different kinds of coal such as long-flame coal,

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gas coal, coking coal and anthracitic coal. The total number of coalfields and deposits is close to 300. Coal is the main energy source in the industrial sector, especially in steel production. The main problem of the meeting domestic demand for energy recourses is in the coal dispersion over the whole country. In the east and the south-east of the country there is only 17% of coal reserves, however, a half of the country GDP is formed there. As a result, more than 60 % of coal is transported by the railways. The average distance of the transportation is 550 km, so it causes the railway congestion, frequent accidents and in conclusion deliveries failures.

Carbon dioxide emissions and carbon dioxide emissions per unit of GDP are technogenic indicators of the economic energy development of any country. Using the data of the World Bank, we can examine the world energy parameters dynamics (from 2000) (fig.1).

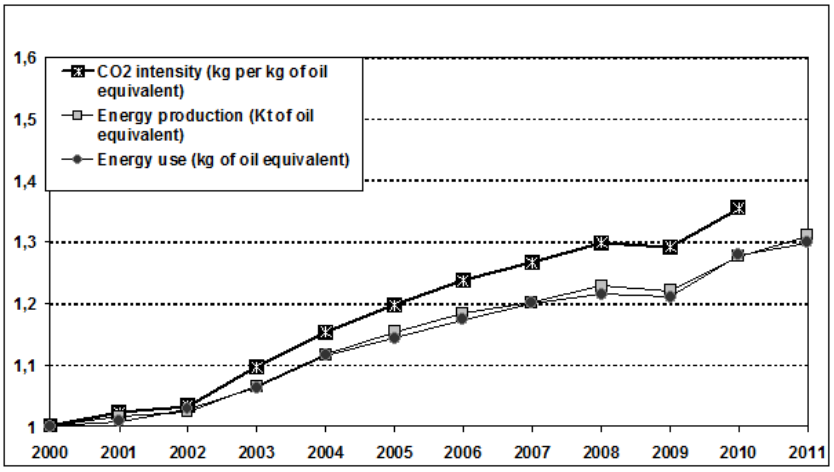

Fig.1. The world energy parameters dynamics [1]

The graph shows a close correlation between CO_2 emissions and the energy consumption amount (R = 0,96). The energy consumption reducing in 2009 was the result of two opposite trends: a significant energy consumption growth in several developing countries, particularly in Asia (+ 4%), and a

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consumption decrease in OECD countries (- 4.7% in 2009 to the 2000 year level). Nowadays about 9 Gt of carbon is emitted in the atmosphere per year and 45% of it is the burning of coal, 40% - oil, 15% - gas. The contribution of different world regions to this process is the following,%: US - 23; CIS - 19; West Europe - 14; East Europe - 7; China - 9; other countries – 28 [1].

Modern China is at the stage of an active growth, thus the energy industry is growing rapidly in China. Along with the rapid industrial production growth the energy consumption amount and the CO_2 emissions growth rates (as a technogenesis marker) are increasing.

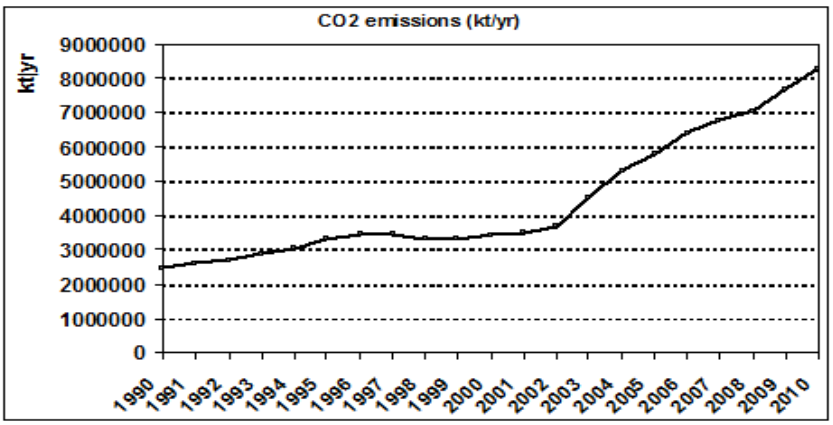

Fig.2. CO_2 emission in China (1990 – 2010) [1]

Figure 2 shows that the carbon dioxide emissions growth rates increased by 11.4% in 1990-2010. Moreover, the carbon dioxide emissions growth rates in the last decade are 5.5 times bigger than the emissions in 1990-2000, that indicates the energy sector intensification in China. An important indicator of the economic growth quality is the ecointensity of economy, which is considered as pollutants emissions (or their negative impact) per unit of a final result. Especially, the carbon intensity of GDP is one of such indicators. It is the total amount of CO2-equivalent emissions per $ 1 of gross production, and the smaller its value is, the lighter a specific anthropogenic impact on the environment is.

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Analyzing the Figure 3, the authors have detected that the carbon intensity dynamics of the carbon intensity of GDP in China in 1990-2010 decreased by 2.3%. It says that the country is moving to a more environmentally sustainable development, improving its economic efficiency [2].

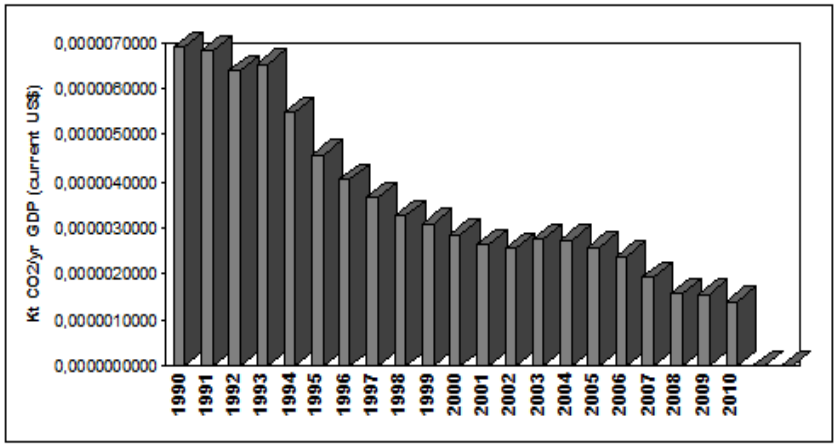

Fig.3. The GDP carbon intensity dynamics in China in 1990-2010 [1]

So, as long as coal will be prevalent in the power balance structure of China the most efficient solution will be a technological re-equipment, effectiveness improvement with the environmental impact reducing as well as new production methods [3]. Furthermore, the energy effectiveness improvement and the renewable energy sector development can improve the situation in the social sphere, especially by the creation of science-intensive jobs positions.

The economic and social development success in China depends on the availability of reliable and cheap energy sources. The region has an important task to find a balance between the energy production and the energy resources efficient use, to realize the energy replacement concept to provide an environmental safety in the domestic market of the country.

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INFLUENCE OF THE THERMAL STATIONS ON THE ENVIRONMENT (BY THE EXAMPLE OF ASTANA CITY)

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Abstract: This article analyzes the impact of the main stationary source of Astana. According to the method of calculating were identified the pollutants spread zones.

Key words: energy sector, thermal stations, environment, air pollution.

Energy industry takes an important place and performs complex functions in the economic development of any country. The main energy resources of Kazakhstan are oil, gas, coal and hydro energy. Thermal stations occupy the leading position in the production of electricity.

According to the statistics, energy is one of the major industries and has an impact on air pollution. The presence of pollution sources determines the quality of the environment. The impact of the urban environment was investigated by Elspeth Mead, Jago Dodson and Claire Ellway, Jonh P. Holden, Kirk R.

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Smith, Irene van Kamp, Kees Leidelmeijer, Gooitske Marsman, Augustinus de Hollander and etc. [1,2,3].

Solving problems of the thermal stations impact on the environment is very important. The enterprises of heat system are usually located in urban areas and differ by the scale of their influence. It is especially important to determine the effect of stations on the environment.

Astana as a separate administrative region needs increased attention to the environmental pollution. It is the fastest growing city in the terms of population of Kazakhstan, and an increasing number of people living in a limited area are exposed to the growing impacts of the thermal stations. Over the past 5 years, the population of the city increased by 173 144 people, i.e. 22.2%. Such high growth rates are typical only for growing cities due to the migration caused by the emergence of the city new functions. The main stationary source of pollution in Astana is the TPP-2 [4].

TPP-2 is located in the industrial area in the north-eastern part of Astana, far from the living area to 1-1.5 km, but there is the impact of this object on the environment of the city. The second stationary source is located in the northern part of the city, which is located closely to residential areas, but the influence of this source is minimal compared to the TPP-2.

The size of the sanitary protection zone calculations are **a complex of** calculations of the emissions removed from all the sources with summation of their actions and the availability of the pollution generated by neighboring enterprises and transport. Obtained results by calculating the size of the sanitary protection zone are depending on the prevailing winds of the area according to the formula (OND-86 by Tishchenko) [5]:

$$L_i = l_0 * P/P_0, \ (P>P\ P_0), \text{ where}$$

L_i - the radius in the certain direction from the source to the border of the sanitary protection zone adjusted for the wind rose (km);

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l_0 – the radius in the certain direction from the source to the border of the sanitary protection zone without correction for the wind rose in kilometers (7, 5, 3, 1, 0,5 km), that is to the regions, in which the concentration of harmful substances is the threshold limit value;

P - average frequency of wind directions in %;

P_0 - frequency of wind directions (for example, when the 8-rhumb rose of wind: $P_0 = 100/8 = 12.5\%$)

Zones of emissions from the main stationary source of the city have been allocated according to this method.

The location of the TPP-2 in distance *1-1.5 kms* from the source is *the zone of very high risk,* and within this area there is an industrial zone of the city without houses.

The territory of the source within a radius of *3 kms* is a *high-risk zone* with the emission of 100-400 t/km^2 and some parts of the city are exposed to the influence of the TPP. This zone is characterized by an average traffic volume of vehicles (1000-2000 units of vehicles per hour), and pollution from these vehicles is average. Compared to the center of the city this territory is characterized by a smaller number of transport units. The territory of thermal stations is not densely populated, compared with the territory of TPP-1. This zone includes a small private sector within the maximum influence of the thermal stations. The private sector accounts for about 60 houses and 10 high-rise buildings, in this zone the influence gets about 0.2 % of the population.

Further, within a radius of *7 kms is the zone of the medium hazard* – average emission of 500-100 t/km^2 and polluting area covers about 40% of all residential buildings of the city.

The following areas are *less dangerous zones,* the release of which is 10-50, 0-10 t/km^2, spread may be caused by strong winds, which could contribute to the spread of emissions throughout the city.

Emissions extending from TPP-2, spread in an area of *7 kms*, while a large part of the city is influenced by the main

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thermal stations of the city and the distance from the source decreases the spread of pollutants.

The process of heat and electricity production of the TPP is permanent, and therefore, it has a permanent impact on the environment while varying impact during the year.

The high volume of emissions in the atmosphere influences the health of the population, leading to deterioration, increasing the number of accidents.

Reduction of the impact of TPP can be achieved by the rational use of energy facilities, i.e. reducing of the power consumption by switching to energy-saving technologies and etc. The main solutions of the problems related to air pollution are:

- changes in the fuel complex;
- improvement of the equipment;
- using of the different cleaning methods;
- modernization of the equipment;
- using of the renewable energy sources;
- improving the extent of landscaping of the city;
- entering the energy-saving technologies.

According to the above mentioned, TPP-2 is a major stationary source of pollution. The increase of energy consumption will undoubtedly increase the number of fuel consumed, therefore increase the amount of emissions. It is necessary to take measures to improve the environmental situation by reducing pollutant emissions.

Solution of the environmental problems is associated with the activities of fuel and energy complex, the need for society and nature support.

The problem of limiting pollution of the environment in recent years has become increasingly acute, and they are associated with the state of the atmosphere. Heat and power production is a necessary mean for the existence and development of mankind, which has a negative impact on the person and his environment, and that is why we must reallocate

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funds to cover the needs of humanity, to find and develop new alternative technologies for heat and power generation and etc.

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CALCULATION OF THE ROLE OF INDOCHINA FOREST BIOGEOCENOSES IN GLOBAL WARMING

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Abstract: On the basis of the spatial mathematical model of the global carbon dioxide cycle in the biosphere the absorption of carbon dioxide emissions from the fossil fuel burning, deforestation, and soil erosion by terrestrial ecosystems was calculated for countries of

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Indochina. Effects of deforestation of tropical forests and soil erosion because of inappropriate land use and climate change were calculated until 2060 for countries of Indochina.

Key words: mathematical modeling, simulating experiments, global biogeochemical cycles, carbon dioxide, global warming, anthropogenic impacts, regional consequences, Kyoto protocol

The aim of this work is the mathematical modeling of the global carbon dioxide cycle and investigation of the role of the biosphere in the compensation impact of anthropogenic emissions of CO_2 to the global climate and calculation of the effects of warming in the countries of Indochina. The main attention is paid to the analysis of the forthcoming growth of CO_2 emissions in the world and in Indochina as well as the role of terrestrial ecosystems of the countries and the world in the global stabilization of the quantity of CO_2 in the atmosphere.

Calculations of the dynamics of the biosphere processes taking into account the impact of economic activities of the world, countries and regions were performed with the aid of spatial mathematical model of the global carbon cycle in the system atmosphere - terrestrial ecosystems – ocean. This model was developed by A.M. Tarko and first published in 1982 in [1], the results of modeling of the global CO_2 cycle were published in the books [2,3]. In the model all land territory of the planet is divided into the cell size $0.5x0.5^o$ degrees of geographical grid (approximately 50x50 km). The model describes the processes of growth and decay of vegetation, accumulation and decomposition of humus in terms of exchange of carbon between the atmosphere, the plants and soil humus in each cell. Recorded anthropogenic emissions of CO_2 to the atmosphere from fossil fuels burning, deforestation (mainly tropical) and soil erosion, related to incorrect use of land. The climate in each cell is characterized by an average annual temperature of the air at the earth's surface and the annual precipitation.

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The model takes into account that the CO_2 emissions from fossil fuels burning occurring on the territory of the countries of the world during about two weeks are mixed in the latitudinal direction and within 2-3 months in the meridional direction within one year. Therefore, each country or region is subjected to the effects of climate change, depending on the total emissions of all countries of the world during one year. This fact determines the necessity for the calculation of the climate change in one given country taking into account the total emissions of countries all over the world and using a spatial model of the climate for the whole planet to calculate changes in the given country.

In the study of the regional impacts of global warming and land use in the countries of Indochina the analysis of changes of phytomass and humus was carried out and changes in the amount of carbon under the influence of industrial CO_2 emissions, deforestation (tropical forests) and humus [4,5] were introduced. Quantity of humus was changed because of soil erosion, related to incorrect use of land, and in the result of regional climate change.

The calculations were carried out during the above-mentioned simulating experiment at the global spatial model of carbon cycle in the baseline scenario of anthropogenic impacts. During the experiment the following countries were chosen: the countries of Indochina - Bangladesh, Cambodia, Laos, Malaysia, Myanmar, Thailand, and Vietnam. Carbon changes in phytomass and humus in these countries during 2000-2060 were under investigation [4, 5].

The results of calculations from 2000 to 2060 are presented in fig. 1-6 [5].

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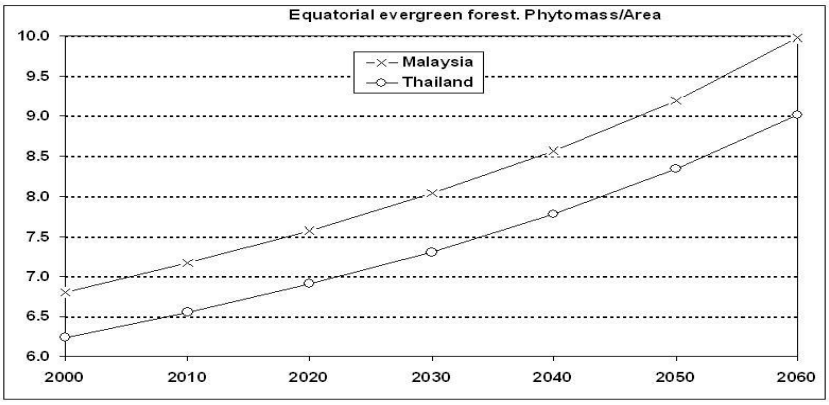

Fig.1. Equatorial evegreen forest. Phitomass/Area

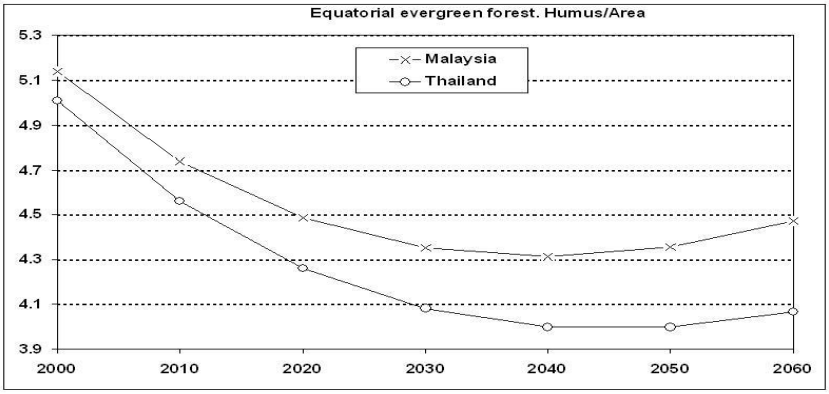

Fig.2. Equatorial evegreen forest. Humus/Area

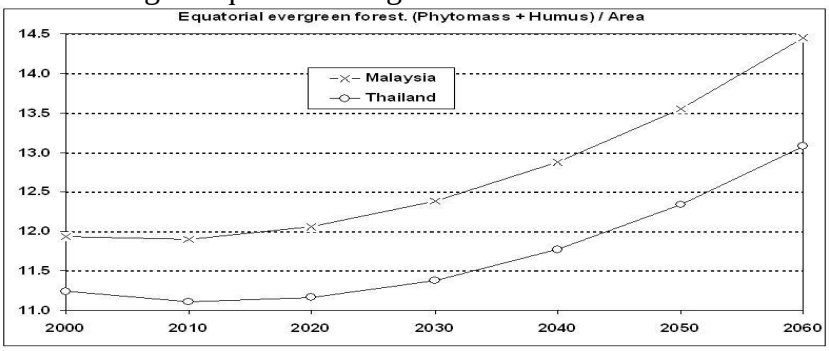

Fig.3. Equatorial evegreen forest. Phitomass+Humus/Area

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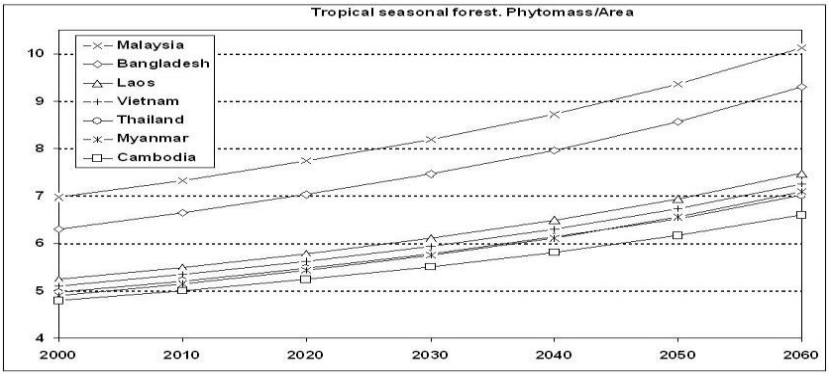

Fig.4.Tropical seasonal forest. Phitomass /Area

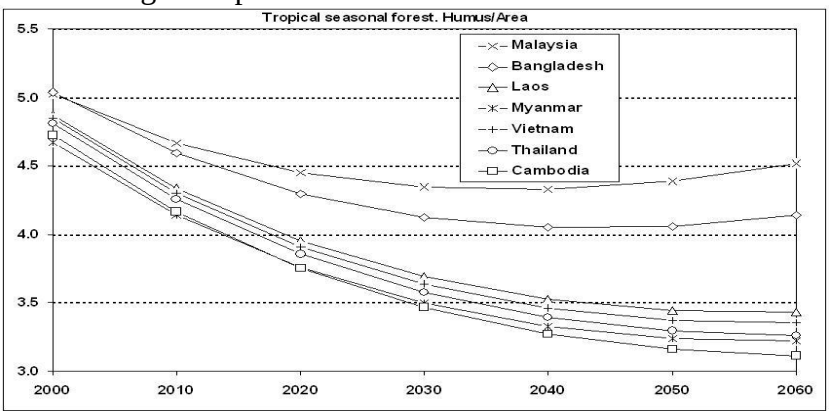

Fig.5.Tropical seasonal forest. Humus/Area

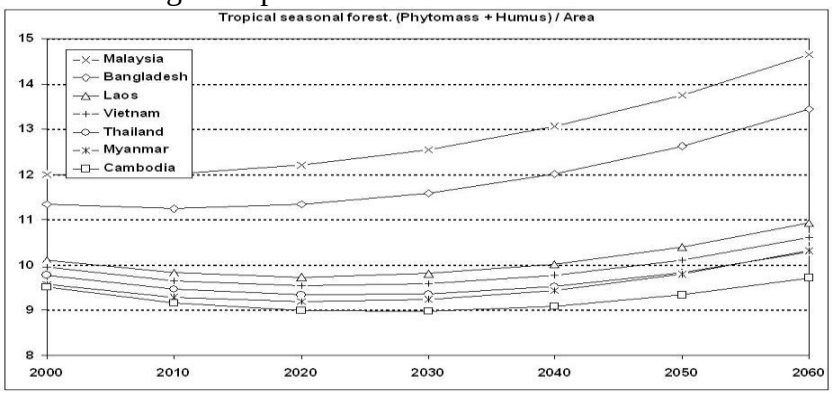

Fig.6.Tropical seasonal forest. Phitomass+Humus/Area

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Conclusion

This paper demonstrates the results of mathematical modeling of CO_2 concentration increase in the atmosphere based on the absorption of the biosphere and the ocean. Different variants of restriction of the carbon dioxide emissions have been estimated. The contribution of the countries of Indochina in the effects of global warming may be noticeable in 2020-2060, leading to the increase of CO_2 amount in the atmosphere. During these years in the countries of Indochina the increase of the forests mass and humus content reduction of the soil will be remarkable under the influence of the global biosphere effects and regional impacts of the development of local economies. [4, 5]

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Lesechko A.S.

MEASURES TO IMPROVE THE SYSTEM OF SOLID WASTE MANAGEMENT IN SVAO, MOSCOW

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Abstract: There are three main ways of recycling municipal solid waste (MSW). These are landfills storage, composting and incineration. Storage in landfills is the cheapest method, based on the weight of solid waste disposed of polygons, as well as landfills. Annual increase in the volume of solid waste that requires disposal causes overflow seats allocated for storage, which makes them dangerous environmental objects.

Key words: solid domestic waste, disposal and recycling of waste, secondary resources, waste handling system, selective waste collection, incineration, pyrolysis.

The existing system of waste collection in Russia does not provide the separation of waste into various components. There are no mechanisms of selective acceptance of waste from the population and subsequent processing. The system of separate waste management should be based on centralized economical and institutional arrangements. [1, 2]

The main objective of the centralized system of solid household waste is waste recycling.

The main objectives of an effective waste management system are:

1. Integrated use of separate collection of solid waste to obtain secondary raw materials to reduce the amount of waste disposed to landfill.
2. The use of polygons according to sanitary regulations.
3. Construction of integrated waste treatment plants.[3]

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Nowadays, the major drawbacks of the system of solid waste disposal of waste in Moscow are:

1. Lack of cooperation between municipalities, city and region.
2. Uncontrolled flow of waste from the city.

Establishment of a centralized system of separate waste collection in the city in a short time cannot be shown as domestic experience. It requires a phased implementation and refinement of existing ways of recycling. In my opinion, a two-stage system with the use of waste treatment and waste incineration plants can be effective in separation of waste material having a value for the recycling of waste without value. The use of such system can show how appropriate selective collection of solid waste is in the city of Moscow, and will reduce the amount of waste entering the incinerators and landfills. [4]

Active growth of urbanization in Russia entails an increase in the number of generated solid waste of urban residential sector. Only in the last 10 years, the number of forming MSW per person increased by 50 kg, while the share of the urban population has grown to 73.2%.[5] This means that a considerable part of MSW comes out of cities. Solid waste increase is followed by the increase of the area of dumps, landfills and other waste disposal sites. In Russia, the problem of MSW is not considered as a single eco-system problem. Whatever protection means the storage spaces and the placement of solid waste possess in any case they have a serious impact on the environment. One of the most effective methods of solid waste disposal is recycling or waste thermal treatment (incineration). [6] Thermal processing reduces waste volume by 2-3 times, used to generate heat for the needs of the city and as well as electricity. Based on this problem the research of modern technologies of thermal processing of municipal solid waste of urban housing sector is an important task. [7]

The morphological structure of MSW is not constant, changing both the ingredients and the individual components in

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the overall composition. This is due primarily to the seasonal changes in the consumption of certain products by the population. For example, generally, the summer fruit and vegetable consumption increases, the amount of food waste rises as well. Seasonal changes affect the moisture content of solid waste can be seen from the chart.[8] Characterization of waste is very important when choosing a technology utilization.

Almost the entire volume of solid waste in Russia is placed in landfills and dumps, and only 4-5% is recycled. Dumping of solid waste at the landfill is a cost-effective and technologically simple method. However, the requirements of environmental protection measures at the landfill are not met. That is a great danger to the environment. There is a danger of atmospheric pollution, groundwater and soil. [9]

Technological leaders can be distinguished by comparing the technology of thermal processing of solid waste by the method of the firms «GKW Consult» and «EastConsult»: the layer combustion, fluidized bed combustion, pyrolysis, gasification and combustion. From an environmental perspective the most effective technologies are pyrolysis and gasification. However, these technologies are not common in Russia. Therefore, the construction of plants using the technology of pyrolysis is unlikely.

However, you can upgrade existing plants. Consider Incinerator №2 North-East of Moscow.

Three incineration boilers supplied by"CNIM" (France) were installed on the incinerator №2. Two boilers are constantly in operation and the third is activated when necessary. The load factor of the third production line is 0.46.

In the process of modernization the height of the combustion chamber was increased. Due to this project the exhaust of dangerous harmful substances such as dioxins and furans was prevented. The flue gases after combustion of MSW must not be less than two seconds in the combustion chamber above the last wave of the secondary air at a temperature not less

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than 850C^0. At this point, a chlorine-containing compound and hydrocarbon compounds decompose under these conditions for the neutral substances. These conditions in the combustor are generated automatically by the gas burner.

Incinerator №2 serves half the areas of the county, collecting and disposing of solid waste residential sector, as well as some organizations. The maximum production capacity of 160 thousand tons of solid waste per year, in fact, the plant recycles 130 tons of solid waste a year required capacity though is 210.6 t/year. It is not enough to dispose of the entire volume of MSW serviced areas. Set pyrolysis system at this plant is impractical. It does not make economic reasons for this need to completely remove the existing units and the combustion install new ones. This will entail a change of air purification system. As a result, it would mean the construction of a new plant on the old site. As an option it is possible to build additional units to increase the combustion power. But do not forget: the factory is located in the city, incinerators emit hazardous pollutants.

To solve this problem it is advisable to change the system of administration and modernize outdated units. This system does not involve a direct increase in equipment productivity, which increased as a consequence of the impact on the environment. This can be done in three main stages. The first is the pre-sorting of solid waste before entering the incinerator. Waste under recycling can be removed from the waste material for the incinerator. Thereby, the amount of solid waste will be reduced at the incineration plant. Waste sorting plants SUE "Ekotekhprom" selecting paper, cardboard, plastic and glass composes 42% of all incoming MSW incineration plant №2 (picture №1). [10]

Construction of additional waste sorting station is not required. It is necessary that MSW fed to the pre-existing waste sorting plant.

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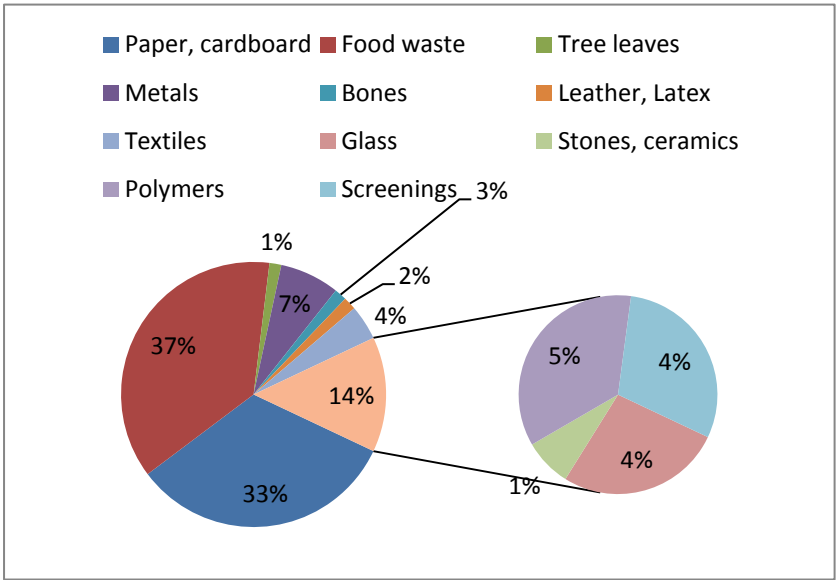

Picture №1.The graph of the percentage of the components in the incoming MSW incineration plant №2.

A MSW that cannot be used for recycling will be transferred to the incineration plant №2. As a result the solid waste will be distributed and a considerable part of it will be delivered to the incinerator №2. Consequently, productive capacities will increase. The waste which is not disposed at the plant is dumped to the landfill, and it is used either for recycling or incineration.

The second step is to install a progressive shearing grate by "Steinmuller" that would increase the efficiency of the incinerator. Such a system is less dependent on the composition of solid waste, and, significantly, the variable moisture content of MSW. This grate unlike used in incineration plants №2 provides a stable supply of air to the furnace. The width of the grate is about 120 mm, and the open area of the lattice, which determines the efficiency of aeration of 1.5 - 2.5%. The air velocity at the inlet of the furnace is 16 - 30 m/s, and the flow resistance - from

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50 to 80 mmAq. The effectiveness of the system, regardless of changes in the composition of solid waste due to automatic adjustment of the air distribution of the individual zones of the lattice. Replacing individual grate is quite simple and does not require the use of special tools, equipment, or parse the entire structure.

The third stage is pre-drying of solid waste; this increases the calorific value of waste, and thus reduces the amount of natural gas used for combustion and ignition. Pre-drying solid waste devices can be embedded in the production line for the drying of solid waste incinerators. The company "Bioindustry-ltd" has developed a technology NIR EcoEnergy which offers a low-temperature drying tunnel at a temperature of 85 ° C with a system of removal of unpleasant odors. The low temperature prevents the formation of ignition of the waste material. With decreasing humidity MSW has increased calorific value and, consequently, the amount of additional consumable gas to maintain the combustion process is reduced.

The choice of technology depends on the type, composition, physical and chemical characteristics of the waste. Analysis of modern technologies and their comparison helped to identify the strengths and weaknesses of the systems used in Russia. The advantages of modern systems are: reuse of slag; generation of additional electricity. The disadvantages are: air pollution; toxic substances emitted.

The technology used for thermal utilization of solid waste at Spetszavod №2 has some drawbacks. Its low productivity needs increasing. The technology is not efficient for the city.

Results of the analysis of modern technologies for thermal utilization of solid waste, provided the basis for the creation of recommendations on the use of technology. Recommendations have been proposed concerning the modernization of the processing unit of the plant. Upgrading the entire boiler and the transition to a more efficient and safe system of pyrolysis and gasification is not appropriate from an economic point of view.

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ENVIRONMENTAL IMPACT OF HEAVY ENGINEERING INDUSTRY EMISSIONS IN DONBASS OJSC «SLAVTYAZHMASH»

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Abstract: The article determines the degree of influence on the atmosphere of industrial activity of the heavy engineering coke enterprise and describes the main sources of the pollutants entering the atmosphere. Particular attention is paid to the development of the environmental protection measures for air protection.

Key words: engineering, air pollution, pollution control equipment, environmental standards, environmental protection measures.

The impact of heavy industry on the environment is the most critical environmental issue for such industrially concentrated and densely populated region as Donbass.

In this study we assess the technological impact of the machine-building enterprise «Slavtyazhmash» on the natural environment of the region, namely the degree of man-made air pollution with priority pollutants in the area of the enterprise. A number of nature protection measures are suggested to reduce the negative environmental impact.

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Engineering defines sectoral and territorial structure of the industrial world, provides all industries with machinery and equipment, and produces a variety of consumer goods. Structural changes in the mechanical engineering occur in two ways. First the basis for the growth of the traditional branches of engineering is changing, as a result of the development of science. The nature of production in some areas of mechanical engineering has been changed. Second, new high-tech machinery industries (automation, robotics, electronics) are being developed [1, p. 101]. Thus structural engineering priorities are:

- accelerated development of high-tech engineering industries;
- social reorientation of the complex, provided accelerated increase in products for the consumer sector;
- greening of production, which involves the production of resource-efficient types of equipment, the use of resource-saving technologies in machine-building production.

In Donbass profile engineering is well-developed. Profile engineering enterprises form a complicated interconnected machine-building complex. It includes all the main branches of engineering. The leading positions are occupied by coke and agricultural machinery. A characteristic feature of the industry is product quality improvement.

Production buildings of «Slavtyazhmash» are located in the south-western part of the city. The enterprise was founded in 1931 after the demand for coke had increased due to the industrialization of the country and the development of the steel industry. The company belongs to danger class III, i.e. it is a low-hazard one.

The normative size of the sanitary-protection zone is defined according to the state sanitary rules of planning and building of settlements (300 m).

The company produces equipment for the coke industry, namely automatic control systems for coke and gas plants, coke

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batteries, coal crushers, knockout grids, handling and lifting complete systems for coal and coke for coke batteries, parts and blanks of steel structures, welded assemblies, scrubbers, pushers, tubing for the subway, car dumpers, general-purpose laboratory equipment, laboratory equipment for the steel industry [2, p. 78].

Situated in a relatively environmentally safe area in the north of Donetsk region, this enterprise is one of the largest sources of man-made environmental pollution in this part of the region. So the assessment of the degree of air pollution by this enterprise, as well as recommendations for its reduction are very significant in terms of environmental stabilization of this region and the region as a whole [3, p. 125].

The technological process of the company has four main workshops: iron-foundry, press-forging, mechanical and assembly ones.

In the first workshop various parts are cast from metal, in the second one – parts are pressed or forged from rolled metal or ingots, in the third workshop they are treated and in the fourth one finished products are made [4, p.322].

The main sources of air pollution are foundry, machining shops, welding and paint shops and plots [5, p. 26]. Pollutants enter the atmosphere mainly from the small boiler, the heating furnace, the drying chamber, the annealing furnace, the boiler, with nitrogen oxides, carbon oxides, methane, and compounds of Co, Ni, Cu, Fe, Cr, Sn, mercury compounds and some others being the main emissions [6, p.135].

To control emissions and reduce the concentration of suspended solids (HDTV) the setting of cyclone ZN-15 as cleaning equipment on the cupola is proposed.

The introduction of this equipment will help ensure compliance with regulatory requirements to environmental quality, will improve the environment; provide good prospects for production development and the maximum economic benefit by increasing resource efficiency.

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DYNAMICS ASSESSMENT OF THE GLACIER INYLCHEK IN KYRGYZSTAN BASED ON ABLATION MEASUREMENTS

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Abstract. Mountain glaciers serve as one of the most sensitive indicators of environmental and climate changes. One of the most interesting glaciated regions in Kyrgyzstan is Inylchek glacier, which is considered to be a unique natural laboratory. It allows conducting a variety of research related to glacier dynamics, climate changes and hydrological regimes and associated environmental natural processes. One of the tasks to assess its dynamics is conducting ablation measurements.

Key words: glaciers, glacial dynamics, climate changes, ablation, glacier velocity, tacheometric survey.

Introduction. Mountain glaciers serve as one of the most sensitive indicators of climate change. Glacier activity is always associated with global average air temperature, precipitations. Mass-balance measurements provide an understanding of the effects of climate change on variations in glacial accumulation and ablation. To estimate the glacier mass balance, we need information about glacier velocity, since the discharge of ice mass is largely dependent on the glacier velocity [1, p.1]. Moreover, the surface velocity measurements are needed to observe the dynamics of glaciers.

The measurements require field studies, which are generally costly, time-consuming, and sometimes are impossible to be conducted, or constrained by rugged topography and bad weather conditions. However, modern remote sensing techniques simplify the tasks, providing a simple way to automatically monitor glacier systems.

Most of glaciers of Central Asia are located in Kyrgyzstan, and amount to 5237 glaciers in the territory of Kyrgyzstan, and cover 6336,1 km². [2, p. 726]. The modern status of glaciers in semiarid parts of Kyrgyzstan is of crucial concern for agriculture and hydropower energy planning, forecasting exogenous processes, etc.

One of the representative glaciers in Kyrgyzstan is the glacier Inylchek.It is the largest glacier in Tian Shan (650km2)

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[3, p.2573] and consists of two branches (Northern Inylchek glacier and Southern Inylchek glacier) separated by the glacial Lake Merzbacher (fig.1).. The Northern Inylchek Glacier has considerably receded, what resulted in the occurrence of Merzbacher lake, and triggered the movement of the Southern Inylchek Glacier towards the retreated north branch and the consequent damming of the lake. The lake regularly releases with water flow up to 1000 m3/second resulting in a high water in the Inylchek River..[4, p.77]. Therefore to better understand the climate and other factors affecting the glacier retreat; the dynamics of the Southern Inylchek and its interconnection with Merzbacher lake outbursts; the hydrological glacial river regime important for lake outburst flood forecasting, hydropower engineering development, and water supply, it is necessary to conduct regular glacier measurements. For this purposes in 2009 a Glacier Observatory Inylchek was established by the German Research Centre for Geosciences (Germany) and Central Asian Institute of Applied Geosciences (Kyrgyzstan) (fig.1).

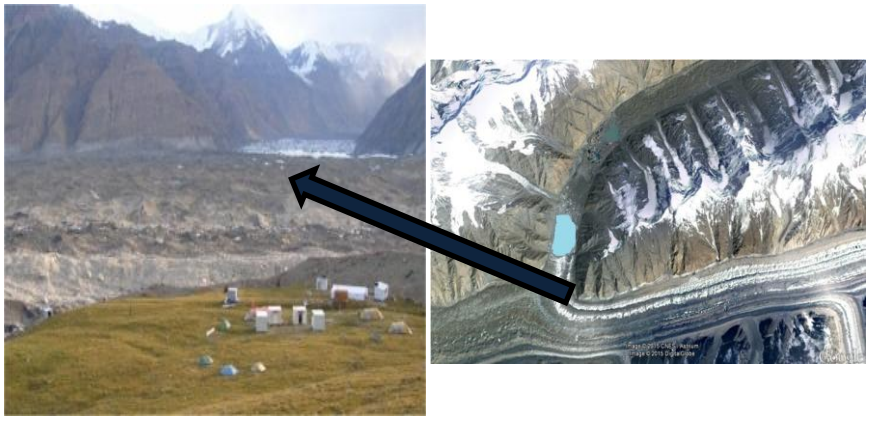

Fig.1. The Global Change Observatory "Gottfried Merzbacher" located in the confluence of the Northernand Southern Inylchek Glaciers. LakeMerzbacher.

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Study area and methods. The Southern and Northern Inylchek glaciers are situated in the Central Tien Shan in Sary-Jaz river basin (fig.1). Glaciers are mostly of summer-accumulation type. [2, p.726]: mountains receive around 75% of precipitation from Westerlies in summer period, and the highest amount of precipitation is observed in the eastern highest part of the region (with the highest peak in Tien-Shan – Pobeda peak, 7439 m) [5].

According to the data of KyrgyzHydromet, the long-term records of the nearest Tien Shan weather station, (3614 m asl.,), show increasing trends in annual mean temperature for the period of observation from 1930 to 2014. (fig.2 a,b)

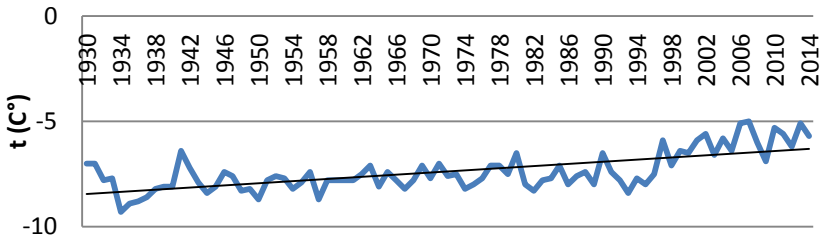

Fig.2a Mean annual air temperature, according to the station "Tien-Shan" for the observation period 1930-2014

While the long-term recorded data according to the Tien-Shan station observations showed on average no significant changes in precipitation.

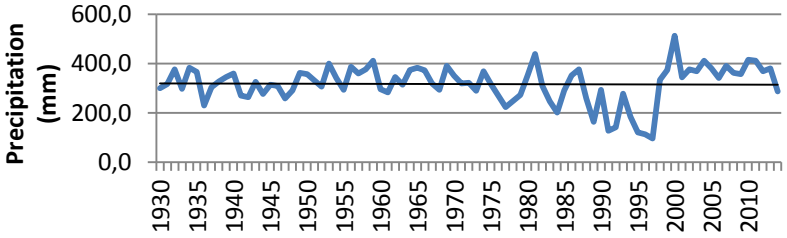

Fig.2b. Mean annual precipitation trend, according to the station "Tien-Shan" for the observation period 1930-2014

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There are many studies performed to understand the overall behavior of the Inylchek glaciers under climate changes [3, 4, 6, 7,].

According to results based on remote sensing data the Southern Inylchek glacier shrank continuously by about 0.1km2, 0.5 km2 and 0.2 km2 during the periods 1974–1990, 1990–1999, and 1999–2007 [3, p.2585]. Measurements at the Tian Shan station show slight decreasing precipitation and increasing temperature in the ablation season (May–September) for the period of 1997–2009 (Osmonov et).Both factors are likely resulted in the glacier thinning and accelerated melting and decelerated accumulation. [3, p.2577]. There are some fluctuations in the glacier elevation; however, the overall trend is negative for the entire period. [3, p.2581]. The main flow direction of Southern Inylchek Glacier tongue showed velocities of around 100ma−1 (~0.3 m/day) [3, p.2585]. Nobakht et al. (2014) presented values of 100–150ma−1 (~0.3–0.4m/day). Some analysis revealed fast moving region in the upper glacier stream (~0.5 m/day). Moreover rates were found to vary in different segments of the glaicer [3]. A significant acceleration was observed right before the glacier drainage and glacier calving into the Lake Merzbacher, reaching to above 40 cm/day during 2009–2010 [8, p.847].

The results obtained by Shabunin A.G., Mandychev A.N., Zaginaev V.V. (based on ALOS/PALSAR images) demonstrate the highest mean velocity for the period of 2006-2010 obtained in the upper part of the Southern Inylchek glacier to be about 0.30 m/day. Close to Mertzbaher lake the velocity appeared to decrease up to 0.21 m/day. (fig.3) [4, p.84].

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Fig.3. Surface glacier velocities (Shabunin A., Mandychev A.N.,

The observed mean flow characteristics of the Southern Inylchek glacier are in good agreement with the existing information.

Moreover, at the present time in-situ ablation measurements are conducted by Kyrgyz specialists for the purpose of systematic collection of data: ice ablation data, ice displacements and flow velocities using ablation gauges and GPS data and electronic tachymeter, used to precisely calculate daily velocities of glacier streams [9, p. 23].

The first tachometric measurements were conducted in the ablation period during summer expedition to Inylchek glacier in July 2014. A ten days survey was performed by tacheometric LEIKATS09 and one reflective pole (fig.4-*V2014*) fixed on the ice dam enabling to monitor daily changes of the ice flow in the glacier calving zone of the Southern Inylchek. According to preliminary results (Podrezova J. and Kalashnikova O.), the mean glacier velocities reached up to 26 cm per day.

Thereafter in July 2015 the tacheometric survey scope was expanded by fixing additional tacheometric poles laterally across the Southern Inylchek right before its turn towards Merzbacher lake and in the way to observe velocities in different flowlines.

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The measurements were conducted in the period from 15 to 25 July, associated with active ablation season and as it turned out later, was a period right before the lake water release.

Results. According to preliminary calculations each point demonstrates different daily velocities and it is observed to vary in time for the survey period. We noticed high velocities within the range from 50 cm/day (R1) up to around 70 cm/day (V1). The velocity rates are lowering when moving from the central flow line southwards and northwards to the glacier body edge sides.

Using information about coordinates of everyday points of the tacheometric pole, the mean values of everyday velocities for every point for the entire period of survey were calculated and appeared to be such as follows: R1.(~50 cm/day), R2. (~60 cm/day), R3.(~60 cm/day), V1.(~60 cm/day), V2.(~70 cm/day) (fig.4). Some of the obtained rates are compatible and in good agreement with previous studies mentioned above. The high rates in the points V1 and V2 differ to a considerable extend from the mean values of the studies.

This fact can be explained by the effect of seasonal factors such as increasing temperature, amount of precipitations and active glacier and snow melt, contributing to growing of the velocity in the most active glacier flowlines.

Moreover, there is a gradual change in velocities observed in the points R3 - R1.. This is probably due to unequal flow of the glacier lines - based on previous studies the highest velocities are usually observed in the middle and northern flowlines of the glacier close to lake Merzbacher.

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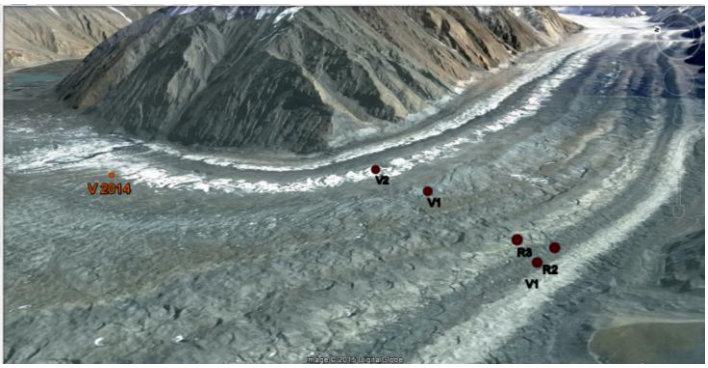

Fig.4. Allocation of tacheometric poles on the Southern Inylchek. 2014-2015

Discussions. There are still many uncertainties observed in the data obtained by electronic tachometer, what arises many questions.

The deviation of measured values from the previously obtained, on one hand can be considered as a norm, due to the effect of various active ablation seasonal factors on flow velocities. However more detailed examination of the obtained data and further regular measurements of the study sites as well are required to validate the existing collected data and to obtain more patterns about glacier dynamics.

Besides, different characteristics should be taken into account when estimating glacier flow velocities, like debris cover, locations of glacier tributaries affecting the flow, air temperature, amount of precipitation, ice-and snow melting.

More investigations on ice elevation and area changes are needed to precisely assess the ablation processes (ice-and snow melting, glacier calving accelerating the accumulation and release of Lake Merzbacher) under the regional warming.

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Inylchek glaciation region is a unique natural laboratory, which allows conducting a variety of investigations related to glacier regimes and climate changes and hydrological regimes. In the long-term perspective, it is supposed to study and understand changes in the dynamics of the glaciers in connection with the global climatic changes and their impact on the water balance in Central Asia and economic development.

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IDANTIFICATION OF ANTHROPOGENIC FACTORS VIA THE INTERPRETATION OF SATELLITE IMAGES OF KIRSANOVSKY RESERVE IN KAZAKHSTAN

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Abstract: We performed the analysis of imagery data of Landsat and SPOT-5 satellites. Vectoring method and visual comparison permit to differentiate and allocate landscapes on space images.

Key words: satellite images, anthropogenic factors, reserve

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Anthropogenic factors of changes are identified and analysed after the interpretation of satellite images and mapping the landscape of Kirsanovsky reserve in Northwest Kazakhstan.

Kirsanovsky zoological state reserve is situated in the East European Plain and Syrt plain province of the Obshii Syrt and Sub Ural plateau within the Northwest Kazakhstan.

In the classification of landscapes it makes Ilek-Rubezhinsky floodplain landscape with forests of oaks, elm-trees, and willow poplars (Populus nigra) and with grassy meadows on the loam chernozem-like floodplain humus-carbonate soil. [1]

In 1991vertebrates in the reserve were various: 60 species of birds, 16 species of mammals, 5 species of amphibians and 6 species of reptiles. [2]

Natural territorial complexes of the reserve are exposed to active anthropogenic influence.

Influencing factors are the following: felling of the forest belt along the border of the reserve; adjacent roads; emissions of the oil and gas enterprises; grazing in the reserve area; recreation activity; poaching (hunting and fishing) [5].

These kinds of human intrusion are as consequence an inevitable change of all natural components of landscapes: soil [4], relief, plant and animal life, which results to the environmental disbenefit, habitat losses, and the loss of biodiversity and ecosystems of areas under study.

Remote sensing using satellite imagery in order to monitor the landscape situation permits the construction of landscape maps of the Earth [3].

The interpretation of satellite images makes us reveal 21 landscapes in the reserve area up the hill of Ural river delta.

We performed the analysis of imagery data of Landsat and SPOT-5 satellites for 2006 and 2007 using the ArgGis program. To differentiate and allocate landscapes on space images we applied both vectoring method and visual comparison.

Mapping showed the following factors of anthropogenic influence :

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– forest felling in the northern, eastern and north-western parts (all these areas are near settlements);

– wilderness fire marks along the southern boundaries of the reserve: almost all plots of land of lake basins are charred;

– the entire territory of the second terrace of the floodplain is plowed, saline land being well set off;

– badlands are clearly seen in the northern and southern part, at the intersection of roads along the borders of the reserve.

This analysis confirms that the research in this area is to be continued.

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EVALUATION OF CLOSED MUNICIPAL SOLID WASTE LANDFILLS OF MOSCOW REGION BY THE ACCUMULATED ENVIRONMENTAL DAMAGE LEVEL

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Abstract: The production and consumption of waste disposal is one of the most pressing environmental problems not only in Russia but also on a global scale. Annually, about 35-40 million tons of municipal solid waste (MSW) are generated in Russia.

Key words: waste, landfills, negative impact, elimination of accumulated environmental damage, pollution.

Virtually all this amount of waste is disposed of on landfills, and only 4-5% is recycled. Such a low percentage of solid waste processing is primarily related to the lack of the necessary infrastructure and processing enterprises [1].

The number of existing landfills is 1399, was 10 times less than the number of authorized waste dump sites. The design capacity of landfills is lower than annual rates of waste accumulation, which in turn take into account only the municipal solid waste disposal. Particularly acute is the problem of disposal of solid waste in the Moscow region [2]. Complex contamination of the environment, including air, water and soil pollution, is identified in districts of closed MSW landfills location [3].

One of the central objectives of the Fundamentals of the state policy in the field of environmental development of the Russian Federation for the period up to 2030 is restoration of the damaged natural systems by minimizing the negative impact on the environment and eliminating of environmental damage [4].

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The Ministry of Natural Resources and Environment of the Russian Federation drafted the Programme "Elimination of accumulated environmental damage". Under the framework of the programme a range of priority projects was selected for eliminating the accumulated environmental damage. Among others, projects on reclamation of closed MSW landfills in Moscow and the Moscow region were included in the programme.

The purpose of our research was the identification of closed MSW landfills which are of priority for subsequent remediation in Moscow and the Moscow region, as well as development of recommendations on methods of reducing their negative impact on the environment [3].

The following tasks are to be fulfilled:

- Analyze the legislative framework on production and consumption waste management in the Russian Federation;
- Assess the decommissioned MSW landfills in the Moscow region by the level of accumulated environmental damage;
- Compare the Russian and foreign experience in landfill remediation;
- Develop a package of measures to reduce the negative environmental impact of closed landfills.

11 MSW landfills located in Moscow and the Moscow region and closed in 2013 and 2014 were selected for this research.

Municipal solid waste landfills of the Moscow region were evaluated on the basis of the following criteria:

1. Number of inhabitants exposed to the negative impact of the object of accumulated environmental damage;
2. Volume and composition of the accumulated waste;
3. Level of the negative impact;
4. Location of the object (landfill) on a territory with a high anthropogenic load intensity;

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5. Presence of specific environmental risks;

6. Presence of natural protected areas.

7. Presence of international obligations on elimination/ limitation of the negative impact [1].

The Federal Law number 458-FL was also adopted to improve efficiency of regulation in this area, to establish conditions for attraction of investments and other financial resources for the operation of waste management infrastructure, including municipal solid waste.

The results of evaluating the projects, preselected for eliminating accumulated environmental damage showed that among the 11 landfills of Moscow region closed in 2014, the priority projects for further restoration are "Dmitrovskiy", "Safonovo", "Hmetevo", and "Electrostalskiy" landfills due to their area and the population negatively affected by them.

Comparison of Russian and foreign experience in landfills restoration showed that in the Russian Federation, restoration is mainly performed by sealing the landfill body through adding layers of clay and fertile soil. To prevent emissions from the landfill different shut-off constructions are used, such as diaphragm wall, sheet piling, geomembrane ceiling curtain. In other countries under study the landfill is completely closed with specially designed geosynthetic materials. Moreover, the systems of gas - and water disposal are installed to clean and process the gas and water for further use [6].

Thus, the set of measures to reduce the negative impact of the landfill on the environment, along with the above methods of restoration must include:

- creation of systems for the collection and disposal of biogas, as well as surface and internal drainage from the landfill;
- construction of local treatment facilities for cleaning landfill gas and leachate;
- use of phytotechnologies to remove, conserve or destruct soil and groundwater contaminants;

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- permanent environmental monitoring of all components of the natural environment until the full restoration of the ecosystem on the landfill site .

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BACKGROUND CONTAMINATION CONCENTRATIONS OF NAULSKY OIL FIELDS TERRITORY ASSESSMENT

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Abstract: The article deals with the assessment of environmental components status as a part of the licenced site subsurface resources development in Naulsky oil field. The background characteristics of contamination before the start of subsurface resources usage were made with the purpose of the further ecological monitoring program development.

Key words: ecological monitoring program, background contamination, oil field

Oil production and associated technological processes are actively changing the natural environment and have influence on its components. As a result of low abilities of the Extreme North ecosystems to self-recovery and difficult cryopedological conditions of Naulsky oil field, it is necessary to pay special attention to the provision of ecological security. One of its instruments is background contamination concentrations assessment.

The background contamination concentrations assessment is the first stage of the production ecological monitoring program of Naulsky oil field that will allow monitoring the state of the environment components during the oil field running and creating

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the factual data base for the adoption of adequate managerial decisions in the nature conservation sphere.

The object of the research is Naulsky oil field, located in the Timan-Pechora oil-and-gas province, Komi Republic. The subsurface user is Rosneft. The features of the oil field are as follows: extra-heavy oil and difficult climatic conditions. Naulsky oil field is located in the subarctic climate zone, in the northern part of the Bolshezemelskaya tundra. The territory of the field is characterized by the domination of massive island spread of permafrost strata, the running of two unnavigable rivers having low fish capacity and a weak self-cleaning capability, the abundance of thermokarst lakes. Gleyic permafrost soil and swampy peat soil are widely spread.

For determination of the background contamination of the territory, the samples of atmospheric air, soil and surface water in three locations of oil field were taken. The atmospheric air sampling was conducted using the aspiration method with the help of electric aspirator PU-4E №3807. The surface water sampling was conducted using barometer, at a depth of 20 to 50 cm in the subsurface layer; each sample included up to 2 liters. The soil sampling was carried out using the envelope method, at a depth of 20 cm, where the content of contaminants was maximum, each sample included at least 500 grams.

Results

The concentrations of contaminants in the atmospheric air does not exceed MPC.

Table 1. The results of analysis of surface water

Surface water			
Contaminator	**Average concentration (mg/kg)**	**MPC (mg/k)**	**Average excess (times)**
Mn	0,46±0,03	0,01	46
Cu	0,027±0,0068	0,001	27
Zn	0,286±0,019	0,01	28
Fe	0,91±0,36	0,1	9
Petrochemicals	0,15±0,05	0,05	3

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The concentrations of manganese, copper, zinc, iron and petroleum products exceeds MPC in the surface water (Table 1);

Table 2. The results of analysis of soil cover

Soil cover			
Contaminator	**Average concentration (mg/kg)**	**MPC (mg/k)**	**Average excess (times)**
As	14,3±8	2	7
S	479±86	160	3

The concentrations of arsenic and sulphur exceeds MPC in soil cover (Table 2).

The distribution of concentrations of contaminants in the atmospheric air is approximately similar and does not exceed the ambient air standard. The analysis of surface water samples revealed the exceeding of the ambient standard on manganese, copper, zinc, iron and petroleum products. The exceeding of heavy metals is normal for deposits of Timan-Pechora oil-and-gas province that is a geochemical feature of water-producing areas [1].

The discovery of oil products in water can be explained by their penetration from neighbouring oil fields, because the oil products due to their specifics do not accumulate close to the sources of pollution, but are carried away upstream. Soil cover analysis shows that all samples feature the exceeding of the content of arsenic and sulphur. In principle, sulphur content is high in the peat soils, while the exceeding of the ambient air standard on arsenic can be explained by the following factors: the understating of the ambient air standard itself and the fact that the given element can make stable allotropic forms [2].

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ЭКОЛОГИЧЕСКИЕ ПРОБЛЕМЫ ЖИВОТНОВОДСТВА В РЕСПУБЛИКЕ СЕВЕРНАЯ ОСЕТИЯ-АЛАНИЯ

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Аннотация: Изложены основные экологические проблемы животноводства РСО-Алания и пути их решения. В частности, основными экологическими проблемами животноводства являются: загрязнение воды; загрязнение воздуха; загрязнение почвы при неправильном внесении навоза; разбивание дернины и ветровые эрозии.

Ключевые слова: животноводство, окружающая среда

Abstract: The article describes the main environmental problems of animal husbandry of North Ossetia-Alania and their solutions. In particular, the major environmental challenges of livestock farming are: water pollution; air pollution; soil contamination if improperly manure; breaking sod and wind erosion.

Key words: livestock, environment

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Животноводческий комплекс на современном этапе – основной загрязнитель земель и других элементов окружающей среды: сточные воды и отходы животноводческих комплексов, использование средств защиты растений и агрохимикатов, перерабатывающая промышленность, ослабление экологической дисциплины и многое другие приводит к тому, что ряд регионов имеют черты, присущие зонам чрезвычайной экологической ситуации или экологического бедствия. Развитие научно-технического прогресса и создание средств воздействия человека на окружающую среду, нерациональное использование природных ресурсов, загрязнение элементов экосистем обусловили ухудшение экологической ситуации. При этом рост потребностей человека стимулирует увеличение масштабов производства. Всё это оказывает сложное и многогранное воздействие на природу: массово гибнут леса, расширяются зоны пустынь, исчезают многие виды живых организмов. В итоге происходит существенное ухудшившейся экологической обстановки экологические токсиканты попадают в организм человека и животных и в комплексе с вредными физическими воздействиями приводят к резким изменениям в нем. На территории Российской Федерации 99 городов, в том числе Владикавказ, находятся в зоне повышенного уровня загрязнения [1].

Определение экологических проблем животноводческого комплекса РСО-Алания является важной и актуальной задачей.

Цель работы - установление экологических проблем животноводческого комплекса Республики Северная Осетия-Алания.

Животноводство Республики Северная Осетия-Алания имеет молочно-мясную специализацию.

Специфика предприятий по выращиванию, откорму и содержанию животных определяется следующим: преобладающее влияние неорганизованных выбросов;

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нерегулярный характер процессов выделения и образования загрязняющих веществ, определяющих выбросы от животных, продуктов их жизнедеятельности, связанный с деятельностью микроорганизмов - деструкторов, которая зависит от температурных условий и среды обитания [2].

Необходимо отметить важнейшие экологические последствия неконтролируемого интенсивного выпаса животных для почвы и растительности: вытаптывание растительности, травмирование надземных органов растений; уплотнение почвы, происходит уплотнение почвы, нарушается ее структура, что приводит к изменению водно-воздушных свойств почвы. Влаголюбивые растения в этом случае выпадают из травостоя; ухудшение роста деревьев; селективное поедание растительности; эрозия почвы; обеднение окружающей среды водой и питательными веществами.

Экологические проблемы в животноводстве необходимо рассматривать в следующих направлениях: влияние животных на окружающую среду; влияние животных на человека; влияние окружающей среды на животных; влияние человека на животных.

Экологическая ситуация в животноводстве определяется соотношением всех вышеперечисленных экологических факторов. Основные загрязняющие элементы - животные экскременты, антибиотики, гормоны и химикаты, задействованные в кожевенном производстве, минеральные удобрения и пестициды, использовавшиеся в орошении кормовых культур. Отходы промышленного животноводства сильно загрязняют окружающую среду.

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DYNAMICS OF FOREST ECOSYSTEMS IN TERMS OF AIR POLLUTION WITH NITROGEN OXIDES

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Abstract: The biogeochemical cycle of nitrogen and its way to soil was studied. It has been showed that ammonium forms of nitrogen are more usual for the top layers of earth; nitrate is usually found in the lower layers. The content of nitrates increases in the soil during the spring when are created the conditions favorable for activity of nitrifying bacteria. For the last 10 years, nitrogen emission of technogenic nature increased which led to change biodiversity of forest biomes.

Key words: nitrogen circulation, nitrates, ammonium ions, technogenic issues, biocenoses, soils.

Human influence on circulation of elements became especially noticeable in the last century because the serious changes happened in natural circulations due to addition or removal of the chemicals, included in them, as a result of human-induced influences.

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Nitrogen is a component of vegetable proteins, chlorophyll, DNA (a genetic code), enzymes and many other components necessary for growth of plants. Plants consume nitrogen in the form of nitrates (NO^{3-}) and ions of ammonium (NH^{4+}). The dominating form is nitrate. Ammonium is more preferable at a stage of early growth of plants, however, during all vegetative period also need for nitrogen increases; plants acquire the most part of nitrogen in the form of nitrate. Gas nitrogen (N_2) from the atmosphere will be transformed by nitrogen fixer (legumes) to ammonia and nitrites which then are recycled by bacteria nitrifies in nitrates. Also nitrogen contains in urea and in live organisms, after their death it is exposed to ammonification with release of ammonia and ions of ammonium.

In spite of the fact that before 80s, nitrogen formations in atmospheric resignations weren't considered as an addition source of forest nitrogen nutrition due to a false theory of low nitrogen content in it, even in 70s-90s growth of forest productivity was observed in various European countries, connected to air pollution with mineral nitrogen compounds (oxides, ammonia) of technogenic origin [1; 2]. However with increase of nitrogen intake, available to plants, the eutrophication of the European woods began, in some year's deterioration of a condition of a forest stand (decrease in natural protection against wreckers, dry tops of trees), change of a ground types cover with types more exacting to nitric food [3]. Now in the territory of the Western and the Central Europe intake of nitrogen from 10-15 to 25-50 kg/hectare of N per year that corresponds is observed and even exceeds amount of nitrogen which the soil is capable to accept and keep [4].

As for Russia, background receipt of compounds of nitrogen with rainfall in the territory of Russia doesn't exceed 5 kg/hectare of N per year up to now [5]. However the question of technogenic nitrogen emission influence on biogeochemical cycle is relevant for our country too.

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All aforesaid defined an objective of this research - calculation of the total nitrogen maintenance (N general) and mineral compounds of nitrogen ($N\text{-}NO_3$ and $N\text{-}NH_4$) in soils of forest biocenoses, and also an assessment of their availability to plants.

Biogeocenoses of the reserve Prioksko-Terrasny were chosen as objects of research. It is located on the left bank of the river Oka in the Serpukhov region of the Moscow state and occupies about 5000 hectares.

The chemical analysis of tests of soils was carried out from one hinge plate on Kudeyarov's method [4] and included definition of the contents in total of nitrogen (N general) and mineral compounds of nitrogen ($N\text{-}NO_3$ and $N\text{-}NH_4$).

The assessment of nitrogen compound availability was carried out by a bioindication method on a quantitative ratio of views with various insistences to nitric food.

As a result of the conducted research it is possible to tell that accumulation of an ammonia form of nitrogen due to fixing processes of the soil absorbing complex is more characteristic for the top layers of earth and with depth decreases, nitrate forms collected in the lower horizons that, apparently, is explained by their washing away from one soil horizon at the expense of resignations infiltration.

It testifies that ions of NO^{3-} are mobile, are badly fixed in the soil and easily washed away by soil waters in deeper layers of earth and reservoirs. The content of nitrates increases in the soil in the spring when the conditions favorable for activity of nitrifying bacteria are created. The cation of NH^{4+} is less mobile, is well adsorbed by negatively charged particles, less washed away by resignations.

According to meteorological year-books over the last 10 years the tendency of a slow, but steady gain of the atmosphere nitrogen oxides pollution was outlined in the Moscow state. Similarly also the specific structure of vegetation changes: the

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share of types, more exacting to richness of soils nitrogen increases.

In conclusion, technogenic emission of nitrogen oxides plays an essential role in providing forest biocenoses of the Moscow state with available nitrogen. However, if the size of nitric loadings is higher than 20 kg/hectare of N per year, at continuous influence there can be a glut of this type of ecosystems. It can lead to suppression of natural processes of decomposition of organic chemistry, accumulation of a forest laying and rags owing to what there will be a delay of biological circulation in the territories which are especially polluted by nitrogen [1].

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PROSPECTS OF DEVELOPING OIL AND GAS SECTOR OF MODERN AZERBAIJAN´S ECONOMY

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Abstract: Prospects for the development of modern oil and gas sector of Azerbaijan based on international investments, taking into account national, regional and global factors.

Key words: temporal dynamics of the oil and gas sector, the field, the Caspian region, energy.

Analysis of the enormous amount of factual material on the oil and gas permits to identify the main factors that determine the development of the energy sector:

– economic structure;

– socio- political and economic system;

– level of science, engineering and technology in the field of exploration and production of oil and gas;

– level of development of the relations of production and productive forces;

– international environment in the oil and gas and financial sectors.

Azerbaijan experts share the history of Azerbaijan oil production by four major periods [1]:

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1. The prehistoric period from the III century BC until the middle of the XIX century – the oil was treated as a natural product, which natural peculiarities allow its everyday use.

2. Early stage of Russian capitalism development (1862-1920 years), is characterized by predatory approach to oil production.

3. The period from 1920 to 1991, is characterized by a rather extensive use of science, engineering and technology for the development of oil and gas production in a planned socialist system based on the command-administrative methods of management.

4. 1999-2014 — modern period of intensive development of oil and gas production under capitalism system taking into account national, regional and global geopolitical factors.

From our viewpoint, there is a need for a more detailed analysis of the historical stages of oil industry development based on the temporal dynamics of oil production from 1871 to 2013 studying (figure 1). The dynamics is characterized by a complex irregularity. Oil production was driven by the following factors: technological advances in drilling activity, the financing of drilling exploration, socio-economic and political developments, as well as the ownership of the deposits, the presence of oil pipelines and refineries. A more detailed explanation of the main stages of the temporal dynamics of oil extraction is proposed in table 1.

Azerbaijan has opened the doors to the international investors soon after independence obtaining in 1991.

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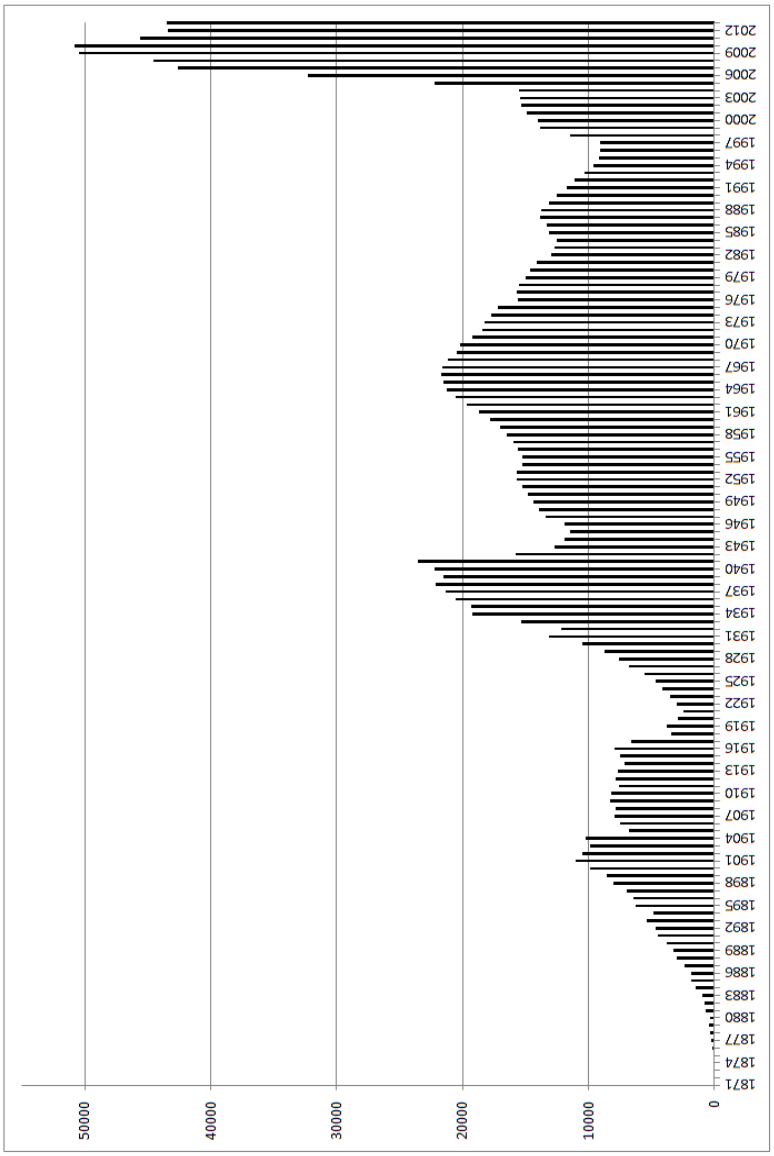

Figure 1. Temporal dynamics of oil production (including gas condensate) in Azerbaijan, thous. Tonnes [2]

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Table 1. The main stages of oil and gas production in Azerbaijan

№	Years	Characteristic of stages
1	1871-1901	The rise in the conditions of the first stage of Russian capitalism
2	1901-1905	The recession caused by the global crisis and the revolution of 1905-1907
3	1905-1918	The unstable state of the Russian economy due to the losses in the Russo-Japanese war and the First world war
4	1918-1921	The decline in chaos condition of the economy as a result of the revolution and the Civil war
5	1921-1941	The rise in the socialist industrialization based on the planned economy
6	1941-1945	The decline due to the approach of the hostilities to the Caucasus and Caspian region during the great Patriotic war
7	1945-1953	The rise of the oil industry in the post-war recovery of the country's economy
8	1953-1966	Further rise of the oil industry in the conditions of stabilisation of a socialist economy
9	1966-1984	The decline in the conditions of stagnation of the socialist economy
10	1985-1991	The decline during the rule regiment of Gorbachev
11	1991-1997	The decline in production in the conditions of transition from a planned economy to a market economy
12	1998-2012	Intensive development of oil production in the conditions of modern capitalism with national, regional and global factors

Oil production in the Caspian region increased dramatically from 2.9 million barrels/daily (bbl/d) in 2009 to peak around 5.4 million bbl/d in the period from 2025 to 2030, and then will decline to 5.2 million bbl/d by 2035. Growth will mainly be provided by Kazakhstan. The growth of oil production will go mainly for export, which will double and reach peak magnitude of 4.6 million bbl/d soon after 2025.

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Caspian gas production will dramatically grow from 159 billion m^3 in 2009 to almost 260 billion m^3 to 2020 and more than 310 billion m^3 to 2035. This growth provides Turkmenistan and, to a lesser extent, Azerbaijan and Kazakhstan. Planned rapid growth of export volumes of gas, which will reach almost 100 billion m^3 in 2020 and 130 billion m^3 in 2035, is compared with 63 billion m^3 2008.

The construction of the Southern Gas Corridor from Azerbaijan to Turkey and on other European markets, paving the way for moving to the West of a large volume of Azerbaijan gas; gas exports from Azerbaijan starting from 5 billion m^3 in 2009, will reach 35 billion m^3 to 2035. [3,4]

Caspian gas exports to China will reach 60 billion m^3 to 2035, gas export to the North of the Russia will be hampered by the development of Russia's own resources within the country and increasing gas exports from Russia to Europe and the Far East.

The development of "Azeri Chirag Guneshli" (ACG) and the opening in 2006 Baku-Tbilisi-Ceyhan of the export oil pipeline – Azerbaijan does not allow OPEC to increase the production of conventional oil after 2000 significantly.

The liquid hydrocarbon extraction from the gas and condensate field "Shah Deniz" in 2009 was about 35 thousand bbl/d, but can grow up to about 100 thousand bbl/d during the second stage of development.

The domestic consumption of oil is relatively low. In 2008 it was slightly below 80 thousand bbl/d. Because of the economic downturn in the 1990s and the subsequent replacement of fuel oil with natural gas for electricity generation the demand for oil in Azerbaijan fell down for more than 2 times (figure 2).

Geosynoptics in the 1990s has led to the mixed results, however, can be a second wave of investor interest in Azerbaijan's offshore reserves. In 2010, the French company Total re-started the research on the Apsheron Peninsula. German company RWE is going to re-examine the structure in

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Nakhichevan. BP has signed a preliminary agreement with SOCAR on the project "Shafag" and "Asiman".

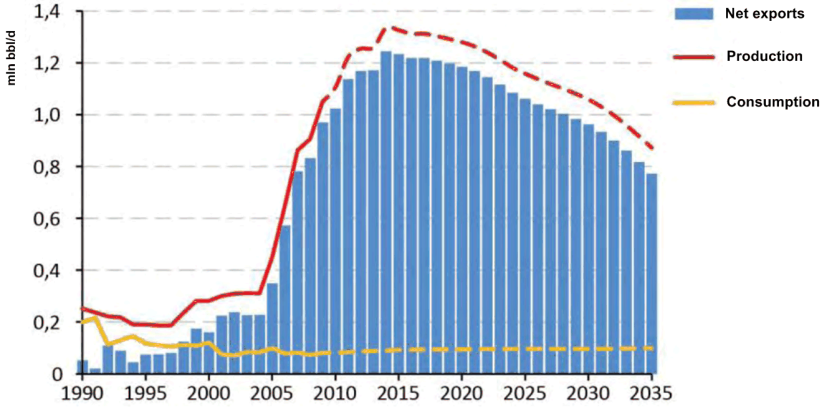

Figure 2. Azerbaijan's oil balance in the New Policies Scenario [5]

In the long term, production capacity could increase due to the settlement of disputes on maritime borders of Azerbaijan. Which includes unresolved status field "Serdar"/"Kapaz" and also promising territory along the border between Azerbaijan and Iran which is not yet open for exploration.

Political decisions of the Caspian countries can make this area available during the forecast period, which will have a significant impact on the oil balance of the region [5,6].

Group deposits in the Caspian Sea "Azeri-Chirag-Guneshli" according to expert estimates, may contain up to 9 billion barrels of recoverable reserves. In 2009 the ACG accounted for about 75% of the volume of oil production in Azerbaijan. The complex was opened in Soviet times, but was drafted to be only a shallow part of the Guneshli. This area now is operated by SOCAR alone, while it accounts for more than two-thirds of oil and gas production.

The rest of the ACG field, which is now exploited by five production platforms is operated by BP on behalf of the Azerbaijan International Operating Company (AIOC). The consortium of BP and eight other companies also includes SOCAR, Chevron, Statoil and ExxonMobil. After the signing of

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the 1994th production sharing agreement (PSA) the production at the field "Chirag" began in 1997 and then grew for three consecutive stages. As a result, total production ACG has grown.

Then the production temporarily declined in 2008 as a result of the explosion of the Baku-Tbilisi-Ceyhan, the main export route for Azerbaijani oil, and due to a gas leak on the platform "Central Azeri" [4].

Approved in March 2010 the project "Chirag" will lead production levels of ACG to a record of 1 million bbl/d., with the investments of six billion dollars. These investments will bring more than 900 thousand bbl/d in 2018 or 2019.

The remaining reserves of ACG would be sufficient to justify further investment. The limiting factor is the expiration of the current PSA at the end of 2024, which will reduce the incentives of the existing consortium to authorize any new projects after the oil project "Chirag". The decision to extend the agreement will be important to determine the medium-term plans of ACG production.

The discovery of natural gas reserves in the offshore field "Shah Deniz" in 1999 led to an increased interest in the potential of Azerbaijan as the main earner and gas supplier. The prospected gas reserves (about $ 50 billion m^3 up to 2035, (Figure 3.)) of the field "Shah Deniz" are about 1.4 trillion m^3. In 2006, Azerbaijan stopped importing gas from Russia for the first time became a net exporter of the following year.

And there are preliminary negotiations to develop the deep (6000 meters) gas deposits (beneath the giant ACG complex) mainly in the field "Guneshli".

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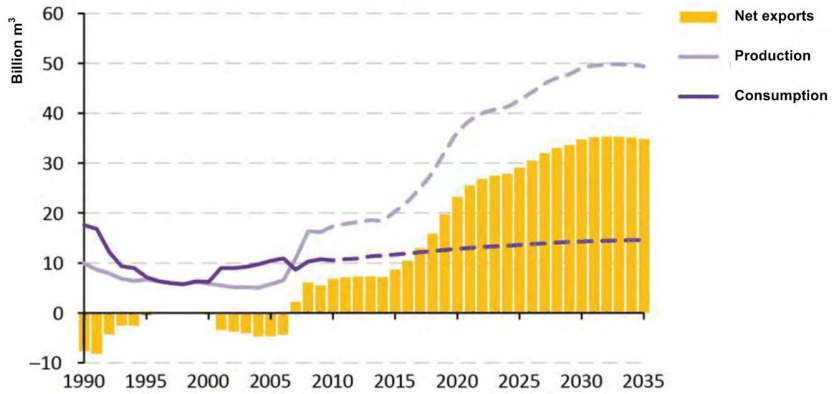

Figure 3. Azerbaijan's natural gas balance in the New Policies Scenario [5]

All the scenarios of energy development suppose the Caspian region participation in the global inter-regional oil and gas market up to the year of 2035. New Policies Scenario expects the growth from 6 to 9% for oil and from 4 to 11% - for gas. The flexible and diversified system of export traffic routes will help the Caspian region to gain access to the international market prices for their resources and to make a full contribution to global energy security.

In 2008, oil and gas exports accounted for about two-thirds of total exports of Azerbaijan, Kazakhstan and Turkmenistan together.

However, as it can be seen from figure 4, the countries of the Caspian Sea are at the beginning of the period of the exceptionally large revenues from oil and gas export. Each of the main exporters of energy founded a special national fund for the percent of the deferred income for future needs. For example Azerbaijan has established such a fund in 1999, Kazakhstan - in 2000, and Turkmenistan - in 2008. At the beginning of 2010 these three funds reposited about 83 billion US dollars [4,5].

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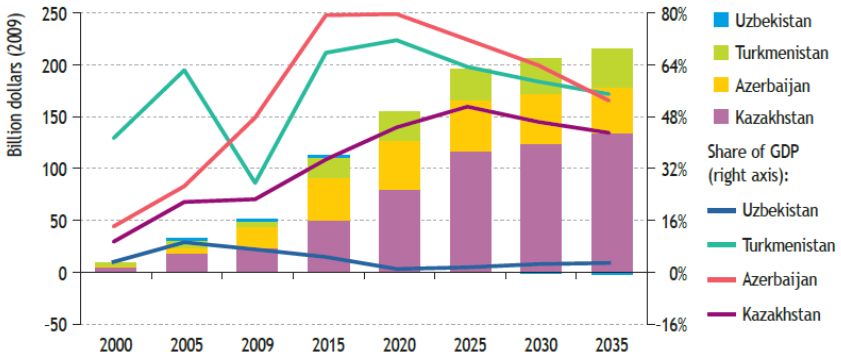

Figure 4. Oil and gas export revenues in selected Caspian countries in the New Policies Scenario [5]

Caspian region is characterized by low level of energy-related CO_2 emissions (1.4%), reflecting the small size of its population and a relatively low GDP. However, the carbon intensity of the region is extremely high, mainly due to the predominant use of fossil fuels and high energy intensity [3,5].

Energy consumption per capita in the Caspian region is an average of 2.2 tons of oil equivalent (toe), compared with 1.8 toe worldwide. The lowest power consumption is observed in Azerbaijan. This testifies to the low non-oil sector development and prosperity of the service sector (Figure 5). [3,7]

Industry in Azerbaijan is defined by less than 20% of energy consumption, while in Kazakhstan by approximately 50%. Electricity generation accounts for about 40% of primary energy consumption in Azerbaijan and around 30% in Kazakhstan and in Uzbekistan. This indicates varying degrees of electricity usage in industry.

New Policies Scenario [5] assumed the most rapid growth of energy consumption in the transport sector, an average of 2.3% annually. The share of the transport sector in the total final consumption remains relatively low, rising from 11% in 2008 to 14% in 2035

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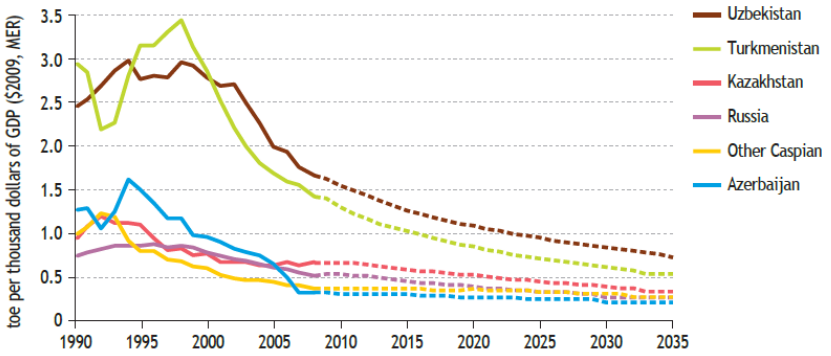

Figure 5. Primary energy intensity in the Caspian and Russia in the New Policies Scenario [5]

The high GDP growth rate, mainly due to rising oil and gas extraction, will continue to boost domestic energy consumption in Azerbaijan during the forecasting period, especially until 2020, although geopolitical events may affect the growth rate.

According to the New Policies Scenario, the demand for primary energy in Azerbaijan will increase by 38% in 2008-2035, by 1.2% annually (Table 2) [5].

Table 2. Primary energy demand in Azerbaijan by fuel in the New Policies Scenario (Mtoe)

	1990	2008	2015	2020	2025	2030	2035	2008 2035*
Oil	11,6	4,1	4,8	4,9	5,0	5,0	5,1	0,8%
Gas	14,2	8,6	9,8	10,7	11,4	12,0	12,2	1,3%
Other**	0,2	0,2	0,2	0,3	0,3	0,4	0,5	3,5%
Total	26,0	12,9	14,8	15,8	16,7	17,3	17,8	1,2%

* Compound average annual growth rate.

** Includes coal, hydro, biomass and other renewables.

Conclusions

1. Oil predominates (> 60%) in the energy resources structure of Azerbaijan, due to its high contribution to GDP. The 85% of electricity is produced by fossil fuels. The country's economy is heavily dependent on the energy sector. Very important is the 10 times increase in GDP from 2002 to 2012. The reduction of GDP

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energy intensity – 5 times from 1995 to 2006, as well as reducing emissions – 2 times from 2007 to 2012.

2. The role of Caspian region transnational corporations is not properly defined yet. The new independent countries are ready to extract oil "at all costs", while the TNCs are in no hurry to spend money for the Caspian Sea ecosystem protection despite the marginal benefits .

3. The comparative analysis with modern sustainable development indicators manifested the incompatibility of modern anthropogenic load with the conservation of the Caspian Sea as a single unique natural object - a natural climate regulator and bioresources source for the Caspian countries.

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POLYMERS BIODESTRUCTION

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Abstract: polymer materials are synthetic and hence remain inert to degradation leading to their accumulation in the environment and therefore creating a serious problem. An attempt was made to review studies about biodegradation of plastics and to define the role of soil microbiota in biodegradation of the most widely used polymers.

Key words: biodestruction, synthetic polymers

Today one of the most topical problems is constant increasing of waste. It should be noted that the highest percentage of this waste is polymer materials. It is impossible to estimate its volume, however, some facts help us to imagine the scale of the problem. For example, the largest landfill in the world, consisting of 90 % of plastic waste, is reported in the Pacific Ocean, on the water territory between the Hawaii islands and Japan. Its weight is approximately 100 million tones and the area is about 600 square kilometers.

Since not easily degraded polymer waste has become a serious source of pollution affecting both flora and fauna.

Thus enormous production and inefficient utilization of polymers lead to their accumulation in environment, especially in soil. Subsequently, in soil system polymer materials are exposed to such factors as light, heat, moisture, chemical conditions and biological activity.

Scientists today tend to believe that the most significant role in plastics degradation is the impact of microorganisms such as bacteria, fungi and algae [1, 916 p.]. Due to the specifics of

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their vital functions, they are able to use polymer materials as power supply [2, 156 p.].

There are a large number of tests which are used to determine the extent of degradation of polymers. Many are respirometric, determining the amount of carbon dioxide released on exposure to fungi, bacteria, and activated sludge (aerobically or anaerobically), compost or soil. Some tests use loss of weight or change in physical properties such as tensile strength and comparison of spectroscopic (FTIR, DSC, NMR, SEM, AFM, XRD) data. Unfortunately, the current standards have not, so far, been equated to each other and tend to be used in the countries where they originated [3, 261 p.].

Data about biodestruction of polymers are contradictory. Mueller suggests that plastics are resistant against microbial attack, since during their short time of presence in nature evolution could not design new enzyme structures capable of degrading synthetic polymers [4, 2024-8 p.]. Research works of other authors disprove this statement. Experiments of Cacciari, Sameh, Pandey and Singh show that such microorganisms as *Pseudomonas chlororaphis, P. studzeri, Vibrio sp., A. niger* can initiate biodegradation of PP, however changes in the structure of plastic are insignificant [5, 3695-3700 p., 6, 275-289 p., 7, 880-885 p.]. Studies of Usha have assessed the biodegrability of PEHD by microorganisms from landfills (*Streptomyces KU8, Streptomyces KU5, Streptomyces KU1, StreptomycesKU6, Pseudomonas sp., Bacillus sp., Staphylococcus sp., Aspergillus nidulans, A. flavus*). The results indicated that six month impact of *Streptomyces KU8* leads to 46.16% weight loss, whereas *Pseudomonas sp.* and *Aspergillus flavus* only to 37,09% and 20,63% weight loss [8, 200-204 p.]. The influence of soil microorganisms (*Bacillus sp., Pseudomonas* sp., Aspergillus *sp., Penicillium sp., Fusarium sp., Aspergillus terreus*) was proved on structure and surface damage of PEHD and PELD [9, 1190-1196 p.]. Aswale and Ade investigated the ability of *Serratia*

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marcescens to degrade PE. The result was 22.22 % weight loss per month [10, 152-153 p.].

In general, all studies deal with degradation of pretreated plastics. The pretreatment techniques reported range from UV-irradiation, γ-sterilization, and thermal treatment.

There are only few reports available on biodegradation of PVC. According to Kirbas et al. PVC having low molecular weight can be exposed to biodegradation by the use of white-rot fungi [11, 335-342 p.].

Our study has focused on definition of the role of soil microbiota in biodegradation of six most widely used in packaging plastics: polyethylene (LDPE, HDPE), polypropylene (PP), polystyrene (PS), polyvinyl chloride (PVC), poly (ethylene terephthalate) (PET). Samples of polymers were exposed in sterile and normal soil at 20° C and pH 8.4. After a month plastics were observed through scanning electron microscopy. The structural changes in the form of pits and erosions indicated surface damage.

The experiment has shown that from sterile soil samples didn't change whereas surface changes were on plastics from normal soil. The most evident degradation was in the sample of PEHD, where surface changes were 52.9 %. Approximately 20 % of PET and PP surface has pits, erosions and microcracks. It was indicated smoothing of microrelief of PVC, but it was impossible to estimate it. PS and PEHD have not changed.

Thus it was represented that soil microbiota can initiate the biodestruction of some synthetic polymers.

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APPLICATION OF AGROCHEMICAL METHODS OF REDUCING THE INPUT OF HEAVY METALS FROM SOIL TO AGRICULTURAL PRODUCTS

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Abstract: The development of modern society has led to the fact that a key challenge of our time is a large-scale pollution of the environment and the problem of survival in such conditions. At the moment, there is a rapid accumulation of chemicals atypical for biosphere, including heavy metals. The accumulation of these substances leads to local or global changes. The main problem of the accumulation of heavy metals in the biosphere is their transition into agricultural products. Such products do not meet sanitary standards and can be harmful to health. This article presents one of the most promising methods to reduce transfer of heavy metals from soil to plants. It has been proved that the use of organic fertilizer Suprodit M reduces the intake of heavy metals in plants.

Key words: Suprodit M, heavy metals, organic fertilizer, agricultural products.

Introduction

In recent decades, due to the rapid industrial development, the pollution by heavy metals around the world has been enhanced [10]. Today, the environment and the agro-ecological complex are assessed as negative. Large areas of farmland are

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polluted with substances such as pesticides, radionuclides, heavy metals, and other organic compounds. In Russia, more than 2 million hectares are contaminated by industrial emissions.

The priority toxic substances in agricultural products are heavy metals, such as lead and cadmium. They have a broad spectrum of negative feedback and pose a greatest risk, even in low concentrations. Elevated concentrations of heavy metals are usually detected in areas with a developed industrial complex, near major highways, as well as on the territory of large cities. They form technogenic anomalies [1, 2].

The main sources of entry of heavy metals to the agroecosystem are: ferrous and nonferrous metallurgy, auto transport, as well as large-scale application of different fertilizers in agriculture [3, 4].

A significant increase in the concentration of heavy metals in the environment causes their accumulation in plants. This has a negative impact on growth, development and productivity. In this regard, the study of methods of lowering concentration of heavy metals in plants is of great practical interest. Heavy metals migrate through the components of the environment [5, 6].

They have the ability to accumulate in the production of agriculture and animal husbandry, which can lead to their non-compliance to sanitary standards [7, 8].

The scientists worldwide study the problem of reducing ingress of heavy metals into the environment and getting clean and safe products in terms of contamination of the ecosystem [9, 10].

Scientists from the Russian Institute of Agricultural Radiology and Radioecology together with the Kaluga Agricultural Research Institute have developed a new fertilizer Suprodit M. It is a long acting tripoli-based sorbent-fertilizer comprising nitrogen, phosphorus, potassium, magnesium, boron, molybdenum, and organic substances. It possesses a high sorption capacity with respect to contaminants. It allows gradual release

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into the soil solution substances necessary for plants, and it also has a prolonged effect.

Methods

Studies of the effect of Cd and a new complex fertilizer Suprodit M on the productivity and accumulation of gray forest loamy soil in plants were carried out on the basis of the Russian Institute of Agricultural Radiology and Radioecology together with the Kaluga Agricultural Research Institute. A greenhouse experiment was set. In vessels with a capacity of 5 kg of air-dried soil spring barley was grown. Cd was introduced into the soil in the form of sulfate salts in an amount of 10 and 50 mg / kg of soil, which corresponds to 5 and 25APC for neutral loamy soil. Nutrients were added in the amount of: N-0.15; P2O5-0.16; K2O-0.19 g/kg of soil, respectively. Industrial fertilizers were introduced in the form NH4NO3, KH2PO4 and KCl. The new complex organic fertilizer Suprodit M contains: N-11%; P2O5-11.5%; K2O-13.5%. Suprodit has a high cation exchange capacity - 126 meq/100g of soil. Fertilizer sorbent was introduced into the soil in a dose of 1.4 g/kg of soil. The replication of the experiment was quadruple. The experiment was conducted on the spring barley, variety Nur.

Determination of Cd in plants and soil was carried out by the atomic - absorption method as described by the Russian Institute of Agricultural Radiology and Radioecology, using the plasma atomic absorption spectrometer ICP-AES, Liberti II, Varian (Spektr AA 250+). Indicators of microbial activity in the soil were determined by the method of the Moscow State University.

Planning of the greenhouse experiment was carried out as described. Mathematical processing of research including the calculation of statistical evaluations was performed using the application package as part of Microsoft Excel 2007.

Results

Pollution of gray forest loamy soil by of Cd at the concentration of 5APC led to a decrease in grain yield of barley

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from 25 to 57%, depending on soil fertility in comparison with the soil in which the toxicant was not applied.

The greatest negative impact on the growth, development and formation of the productivity of barley was provided by the application of Cd into the soil in the variant without fertilizers. The weight loss of grain in the option without fertilizers with Cd concentration of 10 mg/kg of soil was 57% and 74% at a high level of pollution - 50 mg/kg of soil.

Suprodit M and industrial fertilizer reduced the negative effect of Cd on the productivity of barley. After adding Cd into gray forest soil in the concentration of 10 mg/kg the grain yield of barley with industrial fertilizers (NPK) is 27% lower than the soil without heavy metals. When adding Suprodit polluted by Cd10 into the soil the barley yields were reduce by 25%. The effectiveness of Suprodit in reducing Cd phytotoxicity at the concentration of 5APC is 17.5% higher than in the option with N0,15P0,16K0,19.

It should be mentioned that the use of Suprodit M for growing barley on gray forest soil without Cd content increases grain yield by 14.5% in comparison with the industrial fertilizers.

Barley harvest when adding industrial fertilizers in the soil contaminated by Cd50 is 57% lower than in the soil without Cd. The loss of grain yield when growing barley with Suprodit M in the soil containing Cd 50 mg/kg was 45%.

At the same level of pollution of gray forest loamy soil at the concentration of50 mg/kg the use of Suprodit M allowed to increase the grain yield by 46.8% compared to N0,15P0,16K0,19.

Discussion

Increasing the level of soil fertility and improving the conditions of mineral nutrition of plants cultivated on soils contaminated with heavy metals or radionuclides contribute to the production of food products with the lowest content of pollutants.

The results of our research showed that the maximum accumulation of Cd in the grain of barley in the gray forest loamy soil without fertilizer application is: 1.77 mg / kg of grain at the

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Cd concentration of 10 mg / kg and 4.27 mg / kg of grain at the Cd concentration of 50 mg / kg .

Entry of Cd to plants from gray forest soils at concentrations of heavy metals of 10 mg / kg reduces by the introduction of industrial fertilizers 1.5 times in comparison with a variant without fertilizers. The same effect was obtained with N0,15P0,16K0,19 with Cd at a high concentration (50 mg / kg) in the soil.

Adding Suprodit M, which has a high absorption capacity, to the soil contaminated by Cd10, reduces the content of toxic substances in the grain by 2.8 times. Cd accumulation in the barley grain, while creating agricultural background with the usage of Suprodit M in the soil with a Cd concentration of 50 mg, / kg is 2.6 times lower than in the absence of a fertilizer.

Cd content in the barley crop in the gray forest soil without fertilizers at a concentration of 50 mg / kg is 2.4 times higher than at a concentration of 10 mg / kg, and after adding industrial fertilizer and Suprodit M – by 2.4-2.6 times.

At pollution of gray forest soil in the concentration of 10 mg/kg Suprodit M limits the entry of heavy metals by 1.8 times compared to industrial fertilizers. Cd content in grain at a high concentration of the element in soil is 50 mg/kg, at adding Suprodit M – 1,7 times lower than in the variant N0,15P0,16K0,19.

Adding fertilizers for growing barley in gray forest soil increases the removal of Cd with grain. The greatest loss of Cd with crop is obtained in the option with the introduction of industrial fertilizers at a high concentration of the toxic substance (50 mg / kg) in the soil. Application of Suprodit M in Cd contaminated soil allows reducing the removal with the harvest by 1.3 times compared to unfertilized soils.

With an increase of the Cd concentration in the soil from 10 mg / kg to 50 mg / kg the flow of heavy metals at adding industrial fertilizers increases by 1.4 times, and in the option with Suprodit M – by 1.9 times. At the same level of soil

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contamination the removal of Cd with barley with industrial fertilizers is 1.2-1.6 times higher than in versions with Suprodit M.

Using Suprodit M to reduce the transition of heavy metals from soil to plant in the conditions of technogenic pollution and in order to obtain high yields it is noted that increased grain yields of 15-40%, decreased mobility of contaminants in the soil, reduced accumulation of cadmium and lead in grain by 1.,2-2.5 times.

Moreover, unlike most currently known measures to reduce the content of heavy metals, adding Suprodit M has a lasting effect which lasts for 2-3 years.

Thus, the use of the new fertilizer Suprodit M helps to reduce the concentration of heavy metals in products grown on contaminated soils and provides high yields of agricultural crops.

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BATTERY SCRAP COLLECTION AND STORAGE IN MOSCOW REGION: ENVIRONMENTAL AND ECONOMIC ISSUES

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Abstract. The article provides complex assessment of environmental and economic aspects of the treatment of battery scrap in Russia. Moscow region was considered on the local level , recommendations for regulatory activities for the collection were developed, storage and processing of waste batteries and their recycling in the major cities of the Russian Federation was elaborated on.

Key words: battery scrap, OSCAB, waste battery scrap, development of enterprises for processing rechargeable, modernization of the system of collection OCAB.

Along with other heavy metals, lead is an extremely dangerous pollutant yet valuable industrial raw material. Application area of lead is quite extensive, but the largest part is used for the production of batteries. Depending on the presence or absence of systems for collecting and processing waste after a short life cycle, the battery may be lost, becoming a source of contamination to the environment or recycled into valuable secondary raw materials. Therefore, the absence of integrated data collection, storage and recycling of used lead-acid batteries leads to uncontrolled pollution of components of environment and the irretrievable loss of valuable natural resources. Unlike developed countries, in Russia the volume of the collection OSCAB in significantly lower whereas contamination of environment with lead compounds is higher.[1]

The placement of the battery scrap in landfills and illegal sites leads to a gradual migration of lead compounds and sulfuric acid into the underlying soil layers, leading to partial or total destruction of soil ecosystems, contamination of the perched water is migration of lead in surface runoff, to nearby water

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bodies, with subsequent accumulation in the bottom sediments, and disruption of natural biological cycles.

Based on the analysis of the market for secondary lead two environmental and economic problems caused by the lack of a unified system of treatment of lead battery scrap were identified.

The first one is the chronic shortage of industrial lead – with the collapse of the USSR the volume of supply of refined lead with the main supplier – Kazakhstan declined drastically, which led to an annual deficit of ~160 thousand tons. This resulted in a tremendous underutilization of domestic battery plants, consuming about 65% of the total lead.[2]

The second problem is the low development of systems of collection and recycling of battery scrap, the main source of secondary lead. According to current expert estimates, there are up to 1 million tons of battery scrap in Russia with an annual growth rate of 250 – 300 thousand tons, which emphasizes the need to develop a system of collection and recycling of battery scrap, both from an economic and from an environmental point of view.[3]

The development of enterprises for processing of battery scrap and lead-containing waste in the Moscow region is happening without proper coordination, monitoring and necessary legal regulation. There is no official system of points of reception and accumulation of waste batteries, which complicates the process of their centralized collection and further processing. As a result, in all regions of the Russian Federation environmental pollution by lead, disposed acid batteries and other lead-containing waste is virtually uncontrolled.

To study the situation of collection and recycling of battery scrap in Moscow region (at local level) it was decided to conduct sociological research with the aim of collecting information from commercial companies that trade in lead-acid batteries, the problem of handling OSKAB. The study was conducted on the basis of the author's methodology consisting of 4 stages: development of a unified questionnaire; the sample trading

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companies selling lead-acid batteries; a survey of representatives of trade companies; - processing of analysis results.

The survey was conducted among the stores involved in the realization of lead-acid batteries. It showed that the vast majority of entrepreneurs either do not accept OSCAB, or allegedly carry out these activities illegally, because of their inability to meet a large number of legal requirements. So from 30 interviewed respondents-only 6 stores officially accept OSCAB (i.e. only 20% of respondents), compared with EU countries, the USA, Canada the figure is extremely low. [4]

Analysis of actual data showed that on the territory of Moscow there are18 points of OSCAB that also is low on the scale of the metropolis. With 25 – 30 thousand tons OSCAB formed on the territory of Moscow and Moscow region, there is a need for several hundred collection points for full geographical coverage and ensuring adequate level of collection.

However, if you look at the situation more broadly, there is a need for developing a comprehensive program of Advisory activities aimed at modernization of the system of collection and processing OSCAB, including the following clusters: legal regulation, economic measures, organizational measures and technological measures.

It is obvious that modernization of the collection system OSCAB in major towns and cities of the Russian Federation should be carried out on the analogy with the model of developed countries on the basis of the following principles:

- Simplification of procedures for obtaining a license for the procurement of ferrous/non-ferrous metals.
- Simplification of requirements to the availability of staff and equipment.
- The abolition of licensing of activity on collection OSKAB for organizations with a monthly volume of collection less than 5 – 10 tons OSKAB.

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- Tightening of penalties and 10 – 100 fold increase in the size of administrative penalties to organizations engaged in the illegal collection and processing of OSCAB
- Development of measures for preferential subsidies to organizations involved in the centralized collection OCAB. Welcome OSCAB for processing at prices higher than the market average.
- Organization of points of reception OSCAB in pixels of wholesale and retail sale of lead-acid batteries;
- Approbation and implementation of a system of exchange OSKAB. Buying a new lead-acid battery may be exercised only in cases of direct transfer to disposal the spent battery, or on the basis of a confirmation of its utilization made earlier.

Conclusion

Official recycling is only 25% – 30% of the total OSKAB. The domestic system of recycling of consumption waste, in particular scrap battery needs a comprehensive modernization, reform of the regulatory framework, approaches to collection and recycling, as well as with the development of new levers of economic stimulus. Legal regulation of the Russian Federation in combination with the lack of technological base, economic factors and low ecological awareness of the population led to uncontrolled formation of hundreds of thousands of tons of battery scrap deposited on illegal dumps, landfills and warehouses organizations engaged in the illicit accumulation and processing.

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ENVIRONMENTAL ASPECTS OF WOOD WASTE UTILIZATION

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Abstract: The article reviews the use of wood waste in agriculture to improve soil fertility. Biological degradation of wood takes place primarily through the action of microorganisms-destructors. The use of composts increases the yield of vegetables.

Key words: Hard floral wastes, organic fertilizer, bark composting, decomposition process.

Nowadays the problem of utilization of hard floral waste - bark, wood dust, brush, and branches, and etc. - is becoming more relevant because of high concentrations of lignocelluloses in this biomass. A striking example is the infamous PPM

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"Kama", working in Krasnokamsk since 1936. Currently Krasnokamsk mulch collector covers an area of about 20 hectares and contains about 4-5 million cubic meters of plant waste, which is an additional source of greenhouse gas emissions [1].

A solution to this problem may be the use of this kind of waste in agriculture as organic fertilizer to increase soil fertility, crop productivity, protect them from phytopathogenic microflora, and improve the quality of the crop [2, 3]. So, for example, currently Italy produces more than 4 million hundredweights of bio-organic fertilizer by composting bark. Russia also uses tree bark as fertilizes, but only for research. In the Arkhangelsk region the use of composts raised the yield of potatoes from 66 to 106 kg/ha, cabbage - from 190 to 330 kg/ha [4]. A research of the potential of compost as a fertilizer consisting of poultry manure, sawdust, bark, and coarse wheat straw carried out in Buryatia, showed good results in the introduction of 40 t/ha of green mass of oats and potatoes into chestnut soils poor in humus[5].

Biological degradation of wood that mainly consists of cellulose and lignin takes place primarily through the action of microorganisms-destructors such as fungi, bacteria, actinomycetes, and some yeasts. For example, the most active destructors of cellulose substrates are fungi, which account for over 90% of the 100 billion tons of pulp splits in nature a year.

Microbial degradation of plant materials is a complex biochemical process, based on the combined effect of different types of enzymes, for instance cellulases, hemicellulases, pectinases, ligninase.

Cellulose is a set of enzymes including enzymes that carry out the hydrolysis of cellulose to its monomer by cleavage of 1, 4 β-glycosidic bond between D-glucose residues, as well as other enzymes or non-catalytic proteins, acting at the cellulose surface. The role of these enzymes is to split the cellulose to glucose which micro-organisms and invertebrates use as a source of carbon and energy.

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Hemicellulose is a system of enzymes that catalyze the hydrolysis of hemicellulose heteropolysaccharides to monomers producing glucose, xylose, arabinose, fructose, mannose, and glucuronic galacturonic acid.

Proteolytic enzymes (pectinases) are considered as degrading enzymes and pectin, thereby modifying plant cell walls. After their action other polysaccharides cell walls could be attacked by enzymes decomposing them.

Lignin is enzymes that catalyze the depolymerization of lignin - the main flavor component of the cell wall of plants. Feature synthesis of an enzyme is determined by different physical and chemical environmental factors of microorganisms for instance temperature, pH, humidity, etc. All microorganisms destroying cellulose most actively at the temperatures 26-28 degrees by Celsius, the optimum humidity for the development of cellulolytic bacteria is 60-70%, and the optimum pH for actinomycetes varies from 7 to 9.

Microorganisms must receive all the nutrients they need from the environment. That is compounds of carbon, nitrogenous compounds, oxygen, and minerals.

The decomposition process is the oxidation of lignin and this process increases the level of oxygen and the rate and speed of lignin degradation.

In the atmosphere of 100% oxygen lignin decomposition rate increases 2-3 times as compared with the atmospheric air.

Adding nitrogen stimulates the activity of microorganisms and promotes intensive release of CO2 [1].

The synthesis of the enzymes is mainly determined by the content of microelements in the environment (Mn2 +, Cu2 +, Fe2 +, Mg2 +, Ca2 +, Zn2 + and others) as they are part of enzymes, increase their stability activating and stabilizing enzymes.

In view of this, it is obvious that we must study the laws of the biosynthesis of enzymes that catalyze the splitting of polymer plants and determine the optimal conditions for the decomposition of plant materials.

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ANALYSIS OF THE RESULTS OF SUPERVISORY ACTIVITY OF THE ENVIROMENTAL CONTROL AND SUPERVISION SERVICE OF KALININGRAD REGION

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Abstract: The purpose of the work is the identification and analysis of the implementation of supervisory functions by the Service of Environmental Control and Supervision of Kaliningrad region.

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Key words: The Service of Environmental Control and Supervision of Kaliningrad region, control and supervision activities, analysis, administrative offences, penalties.

Rapid technological progress of industry, contributing to the economic development of any country should not have a negative impact on the environment. Environmental preservation is the main goal of the environmental policy. One of the mechanisms for the implementation of this policy is the environmental supervision by state authorities [1, p. 1].

The subject of the study is peculiarities of implementation of state supervisory functions in the Russian Federation at the level of the subject of the Russian Federation, namely the implementation of control and supervisory functions by the Environmental Control and Supervision Service of Kaliningrad region (next the Service) from 2012 to 2014 inclusive.

The Service functions in the field of special environmental control at the regional level, i.e. it is a corresponding representative and executive authority of constituent entities of the Russian Federation. Activity of the Service is organized and coordinated by the Deputy Prime Minister of Kaliningrad region. The Service provides regional ecological oversight of more than nine thousand economic entities in the territory of Kaliningrad region.

In the period from 2012 to 2014 inclusive the Service realized supervisory activities in the field of air protection, waste management, water protection, rational use of resources and protection of green spaces [3, p. 192].

From 2012 to 2014 there were 502 inspections.

It can be noted that during the review period the annual number of unscheduled inspections was several times higher than of scheduled ones, amounting to 76-86% of the total.

It should be noted that the number of planned inspections remained almost unchanged compared with the number of

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unscheduled ones, which in 2014 increased almost twofold in comparison with 2013. For three years all scheduled inspections were field ones. Whereas about 50 unscheduled inspections annually were documentary ones.

According to Russian legislation unscheduled inspections can be initiated by a variety of sources, such as public authorities, non-governmental organizations, the media, business entities and citizens, etc. According to this criterion, most unscheduled inspections are initiated by order of the Service and at the request of Kaliningrad inter-district environmental prosecutor's office, as well as due to verification of prescriptions. Every year they average 36%, 22% and 23% respectively.

Within three years, all the offences related to four heads of the Code of Administrative Offences and of the Code of Administrative Offences of Kaliningrad region. Major violations of Chapter 7 of the Code of Administrative Offences were in Articles 7.3 and 7.6, of Chapter 8 – in Articles 8.1, 8.2, 8.21, 8.41, of Chapter 20 – in Article 20.25, of Chapter 19 – in Articles 19.6, 19.7, 19.4, 19.5. It should be noted that in 2012 all offences relating to Chapter 19 of the Code of Administrative Offences were committed only under Article 19.5 "Failure to comply with an order". In general, there is the tendency towards an increasing number of protocols.

The largest number of violations refers to Chapter 8 of the Code of Administrative Offences, namely Article 8.2 – “Failure to comply with environmental, sanitary and epidemiological requirements for handling industrial and consumer waste, substances that deplete the ozone layer, or other hazardous substances”; Article 8.41 – “Failure of timely payments for negative impact on the environment”, Article 8.21 – “Violation of rules of atmospheric air protection”, Article 8.1 – “Failure to comply with environmental requirements for the implementation of urban development activities and exploitation of enterprises, buildings or other objects”. It should be noted that there is a steady increase in violations of Article 8.1 and conversely, the

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trend for reduction in violations of 8.21. The number of offences against Articles 8.2 and 8.41 within the analyzed period varies slightly [2].

Most of the rulings are imposed on the officials and year on year the number of such rulings decreased from 117 in 2012 to 74 in 2014. An increasing number of rulings are imposed on entrepreneurs and citizens. The total number of rulings in 2012 was 159, and by 2014 it dropped to 117.

Taking into account the number of rulings one can note that the largest number of them is imposed on officials. If to take into account the total amount of fines it can be pointed out that the fines that legal entities are burdened with are several times heavier than those paid by officials. In 2012, 2013 there was a noticeable increase in the amount of fines, and in 2014 – a decrease by half.

Within one year 79-89% of fines were collected. Each year about three to five affairs of the remaining ones are transferred to the bailiffs. A few per cent of affairs are those that were appealed against in court, in 2012 there were seven cases of that kind. About 10-20 fines per year can be in a workflow.

In 2012 and 2013 only about 50% of the fines were exacted in terms of money. In 2014, the situation has improved and amounted to 82% of the total amount of fines. In 2014 the issued rulings resulted in the amount which was one million rubles smaller than that in previous years.

On the basis of the conducted analysis of supervisory activities concerning the environment at the regional level it can be concluded that:

1. The efficiency criteria of control and supervisory activities in the field of the environment focus on identifying the environmental violations, not preventing them.

2. There is absence of clear criteria for division of objects of state environmental supervision into objects of the federal and regional level.

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3. There is inadequate funding and staffing of control and supervisory activities in the field of environmental protection.

4. There is a low fee for a negative impact on the environment and fines for violation of environmental regulations.

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WATER RESOURCES AND ECOLOGY: MONITORING, POLLUTION AND RESTORATION

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ASSESMENT OF THE ENVIRONMENTAL IMPACT OF THE FAR EASTERN SHIPBILDING AND SHIP REPAIR CENTER ACTIVITY ON ZOLOTOY ROG BAY WATERS

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Abstract: Polluting substances get to the ocean as a result of dumping sewage of industrial enterprises, agro-industrial complexes, city and rural settlements, and tankers to the rivers. Pollutants also come with superficial drain and atmospheric precipitation. In this regard, to assess the impact of ship-building and ship-repair enterprises on the sea water areas is very acute.

Key words: polluting substances, ship repair center, Zolotoy Rog bay waters

In recent years one of the global environmental problems has been marine pollution by various xenobiotics – oil and oil products, pesticides and surface active agents (SAW), heavy metals and other substances, dangerous to the environment [1]. Polluting substances get to the ocean as a result of dumping sewage of various industrial enterprises, agro-industrial complexes, city and rural settlements, and tankers to the rivers. Pollutants also come with superficial drain and atmospheric precipitation. Thus in many areas pollution of the World Ocean

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has reached such a scale that it has lost the capacity for self-cleaning and regenerating the living resources. This problem is particularly acute in the Far East where, because of morally and physically outdated equipment, enterprises of the extracting, chemical and fishing industries dump their wastes directly into the sea [2]. While processing oil products and repairing ships and mechanisms in ports, pollution of the water area can occur due to insufficient tightness of tanks and irregularities in the work procedure [3]. Abandoned, semi-scuttled or scuttled vessels and other water craft pose a significant hazard to the marine environment too. [4]

In this regard, it is a matter of great importance to assess the impact of ship-building and ship-repair enterprises on the sea water areas.

The object of the research was the ship-repair enterprise «SRC Dalzavod» located on the bank of a Zolotoy Rog bay, Vladivostok.

The primary activities of «SRC Dalzavod» are ship repairing, general and marine engineering, as well as providing services for other enterprises. «SRC Dalzavod» includes a number of key departments, support services, undersized fleet. Household, industrial and surface (rain and snowmelt) waste waters are generated at the enterprise. The discharge into the sea water is made by 11 organized outlets. Analysis of «SRC Dalzavod» monitoring data for a three-year period from 2011 to 2013 was carried out to assess the negative impact of the enterprise on the waters of the bay. According to "The program of supervision over a water object and its water protection zone", which has been implemented by the shipyard since 2009, the quality of discharged waste waters is determined once every three months on the following parameters: BOD, Suspended solids, oil products, total iron, nitrate - ion, anionic surfactants, phosphate - ion, phenolic, copper, and zinc. The highest concentrations were observed for suspended solids and BOD (up to 100 MAC). That

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exceedance of MPC leads to untimely oxidation of organic substances in the sea waters and negatively affects the biocenosis of the water area [4].

Moreover, exceedance of maximum permissible concentrations (up to 6 maximum concentration limits) was observed for phosphorus, phenols, oil products, iron, which also leads to the disruption of the ecological balance of the Zolotoy Rog Bay. For example, increased concentrations of phosphorus can cause a rapid bloom of blue-green algae, which in turn leads to the degradation and destruction of the entire ecosystem due to the release of toxins and creation of anoxic zones [5].

Thus, it is possible to draw a conclusion that «SRC Dalzavod» has negative impact on the water area of the Zolotoy Rog Bay waters. As a possible solution, it is recommended to make complete replacement of the existing treatment facilities of the enterprise, paying special attention to septic tanks, grease collector, settlers and oil traps.

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ENVIRONMENTAL ASSESSMENT OF RAIFSKY PART OF VOLGA-KAMA NATURAL BIOSPHERIC RESERVE IN THE AREA OF INFLUENCE FEDERAL HIGHWAY A295

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Abstract: The assessment of changes of stability of development of a birch povisly (is carried out by Betula pendula roth.) in size of the fluctuating asymmetry in the territory of the Raifa part of of Volga-Kama natural biosphere reserve. It is revealed that the stream of motor transport has essential impact on quality of environment of the reserve.

Key Words: birch, the reserve, the fluctuating asymmetry, bioindication.

The aim of this study is to evaluate the environmental area Raifa part of Volga-Kama natural biosphere reserve in the zone of influence of the federal highway A-295.

Under the fluctuating asymmetry (FA) understand the change of bilateral independent characteristics of the organism. It was found that the phenomenon of fluctuating asymmetry due to the violation of the stability of the body as a result of external factors, first of all - man-made. Along with the traditional methods of control of chemical pollution by examining samples of water, air, soil, there are methods of biological indication

based on the change in the morphological structure of plants under the influence of man-made pollutants. The most frequently used assessment of the stability of living organisms on the level of asymmetry of morphological structures, in particular the severity of fluctuating asymmetry [1, 2].

Destabilization of development for metric signs there already at a relatively low level of environmental violations that have not yet associated with irreversible changes in populations. This allows you to use the FA as an indicator of even minor deviations from the background environment settings status is not yet leading to a significant reduction in the viability of individuals [2].

The most dangerous and intense source of air pollution of cities is road transport, emissions which found about 300 hazardous substances, among which are especially dangerous carbon monoxide, hydrocarbons (carcinogenic benzopyrene and benzanthracene, formaldehyde, benzene), nitrogen oxides, soot, lead, mercury, sulfur dioxide, aldehydes [3]. On the territory of the Republic of Tatarstan (RT) Total gross pollutant emissions from road transport businesses and individuals in 2013 amounted to 335.3 ths. Tons, or 52.9% of total emissions in the Republic of Tatarstan.

Volga-Kama natural biospheric reserve is located in the east of the Russian plain, in the north of the Middle Volga, in Tatarstan. In biogeographic respect of the territory of the reserve is located in the Eurasian area of temperate forests. Raifa part - is in the zone of subtaiga forests and Saralinsky - the zone of deciduous forests. Since both sites are located directly on ancient terraces of the river. Volga, his landscapes are intrazonal type. Raifa part of the reserve is located in Zelenodolsk district of Tatarsttan, 30 kilometers west of the city of Kazan.

Volga-Kama natural biospheric reserve was founded April 13, 1960 (Council of Ministers of the RSFSR on the organization of the Volga-Kama reserve). Protected areas are objects of national heritage. Ministry of Natural Resources and Ecology of

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the Russian Federation carries out the state control in the field of organization and functioning of especially protected natural territories of federal significance (RF Government Resolution of 29.05.2008 № 404).

In the continuation of pre-existing studies [4, 5], the aim of this work was to study leaf fluctuating asymmetry Betula Pendula Roth in protected areas in Raifa part of Volga-Kama natural biosphere reserve in the zone of influence of the federal highway A-295 and settlements Raifa and gardens.

To conduct research on the FA, we selected 12 sites that are on the territory of the Volga-Kama reserve (2 sites), and along the track (10 sites), the entire array of data has been received, including the 1200 measurements.

Based on the data card has been visualized in the GIS program SURFER, on which to judge the spatial distribution of the index FA pledged sites. The results suggest unfavorable state of the environment in the area of influence of the federal highway. At 8 sites observed the critical state of the environment, and 4 sites there is a significant deviation from the environmental quality standards. Thus, despite the considerable distance from the city of Kazan, the flow of vehicles at the Raifa part of Volga-Kama natural biosphere reserve in the zone of influence of the federal highway A-295 significantly influences the formation of the quality of the environment surrounding areas.

Calculation of the coefficient of fluctuating asymmetry of silver birch (Betula pendula Roth.). The obtained results are shown in Fig. 1. Locations: 1 - village (route to Kazan); 2 - village Georgian (route to Kazan); 3 - the road from village Sadovaya; 4 - village Dubrovka (route to Zelenodolsk); 5 - forest near the monastery; 6 - village Georgian (route to Zelenodolsk); 7 - the Monastery; 8 - The road from the highway A-295 to the territory of the reserve Raifsky; 9 - the road to the village Garden; 10 - village Urnyak (route to Zelenodolsk); 11 - village Urnyak (route to Kazan); 12 - village Garden

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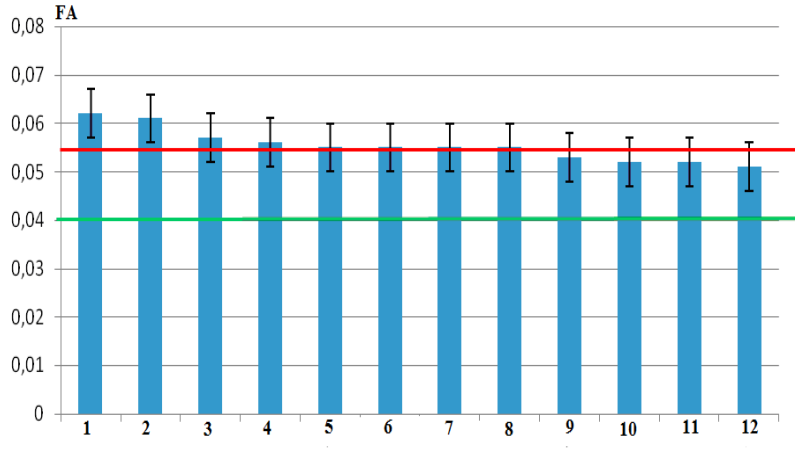

Fig. 1. The value of FA Raifa part of Volga-Kama State Natural Biosphere reserve

In most of the points Raifa part of Volga-Kama natural biosphere reserve on the plot the zone of influence of the federal highway A-295 integral index fluctuating asymmetry indicates the critical state of the environment. This is the point of the road from the village. Gardening in the woods near the monastery, p. Dubrovka (route to Zelenodolsk), p. Dubrovka (route to Kazan), the road from the highway A-295 to the territory Raifsky reserve monastery village. Georgian (route to Zelenodolsk), and the village. Georgian (route to Kazan). And 4 points as the quality of the environment is characterized by a significant deviation from the norm, this is the point of living area, the road to the item. Gardening, pos. Urnyak (route to Zelenodolsk) and Urnyak (route to Kazan). Obviously, the indicators of stability, from samples taken at the roadside studied sites indicate a high level of human impact, namely transport pollution.

Conclusions:

1. The results of the investigations on the grounds set forth in the section Raifsky part of Volga-Kama natural biospheric

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reserve in the zone of influence of the A-295 highway in 2014 revealed that the level of FA in all areas surveyed exceed the value of the conventional norms and consistent with the critical state of environmental quality (FA>0,054) .

2. It was found that, despite the considerable distance from the city of Kazan and the availability of green areas that contribute to the dispersion of pollutants in the territory Raifsky part of Volga-Kama natural biospheric reserve in the zone of influence of the federal highway A-295, transport affects the formation of the quality of the environment surrounding areas.

3. Comparison of the results of a number of researchers who conducted observation in the same manner in the protected areas of the Russian Federation showed that the surveyed area has the worst performance (4 to 5 points Environmental Quality). This fact is explained by the presence of the highway in the vicinity of protected areas Raifsky area, as well as secondary roads, passing through the protected area to the neighboring settlements.

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INTEGRATED QUALITY ASSESSMENT OF DRINKING WATER

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Abstract: Nowadays, water quality issues continue to be an essential research in the field of hygiene and ecology. The authors carried out an integrated assessment of the drinking water from water supply systems in Selyatino settlement, the Naro-Fominsk district of the Moscow region, in terms of chemical harmlessness indicators. It was revealed that there are elevated levels of health risk at peroral intake of drinking water from all the wells at the settlement.

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Key Words: integrated assessment, water quality, drinking water, risk level, chemical indicators, population health

This research is devoted to an integrated quality assessment of the drinking water supplied by OJSC Gidromontazh Trust to the settlement of Selyatino, the Naro-Fominsk district of the Moscow region. In other words, we analysed the quality of the water piped to the consumers in the Naro-Fominsk district [1].

Despite the technological progress, the problem of drinking water quality is still urgent. According to the World Health Organization, about 75% of human diseases are related to drinking unsafe water, as well as domestic use of water that doesn't meet the hygienic standards [2]. It should be noted that in the Russian Federation municipal water purification systems in cities and settlements do not generally meet the requirements of the SanPiN 2.1.4.1074-01, "Drinking water. Hygienic requirements to the water quality of centralized drinking water supply systems. Quality control» [3]. Besides, water distribution systems are so worn-out that they themselves can be sources of secondary water pollution. Moreover, accidents at water purification systems and water intake zones aggravate the problem of pure water [4].

The settlement is located in the Central Federal District, in the south-west of the Moscow region, approximately 50 kilometers from the Moscow ring road along Kievskoe Highway, and it was constructed by the trust. The enterprise was founded in April, 1955. Being a very large facility, Gidromontazh Tust plays a significant role in the Naro-Fminsk district. It is engaged in building objects of industrial, civil and inhabited appointment, though the main sphere of its activities is underwater works. Nowadays OJSC Gidromontazh Trust is the asset holder of the water-intake facility, providing the household water use and the industrial water supply in Selyatino. Eight water wells of

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Podolsko-myachkovsky and Aleksinsko-protvinsky aqueous layers are at the disposal of the water-intake facility.

Based on the above, the question arises: whether the water supply quality in Selyatino meets the hygienic standards and whether the health risk rating is acceptable for the population, in case of chronic intake of harmful chemicals contained in this drinking water.

Thus, the work objective is to make an integrated assessment of the drinking water from the water supply system in Selyatino in terms of chemical harmlessness indicators.

To achieve this goal we set and completed the following tasks:

1. To calculate and evaluate the risk of ingesting chemicals with olfactory and reflectory effects, while drinking water
2. To calculate and evaluate non-cancerogenic risk of ingesting chemicals with toxicological effect
3. To calculate and evaluate the total lifelong cancerogenic health risk for the Selyatino inhabitants consuming tap water
4. To calculate and evaluate an integrated indicator of the drinking water quality.

In this work we assessed the health risk from drinking water contamination. Health risk assessment is a scientific and internationally recognized tool which helps developing optimum decisions on such matters as environmental management and community health. In this country risk assessment is one of the methods for evaluating the results of social and hygienic monitoring [5]. In 2004 Guidelines for the assessment of health risk when exposed to chemicals and environmental pollutants (R.2.1.10.1920-04) were approved, listing the directions of risk evaluation used in the system of the consumer rights and population wellbeing supervision. Over the past decade, great importance has been attached to the issues of reconstruction, improvement and modernization of water supply systems, to receiving the maximum result at the minimum or optimum expenses [6]. Realization of this strategy requires transition from the current system of drinking water quality assessment (based on

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the "corresponds – doesn't correspond" principle), to establishing quantitative and qualitative characteristics of harmful health effects induced by unsafe drinking water [7].

In this regard it is necessary to make an integrated drinking water quality assessment on indicators of chemical harmlessness based on the methodology of human health risk assessment. So the Methodological Recommendations (MR) 2.1.4.0032-11, "An integrated assessment of drinking water from water supply systems on indicators of chemical harmlessness", were approved and enacted on July 31, 2011 [8].

On this basis, in our work we considered some types of risks, namely:

- risk of olfactory and reflectory effects;
- risk of toxicological impact (assessment of drinking water quality by the non-threshold models of cancerogenic and non-cancerogenic (all-toxic) effects).

The following water indicators were evaluated: chromaticity, hardness, turbidity, pH, phenol, oil products, barium, borium, iron, lithium, cuprum, hydrargyrum, lead, sulfates, fluorine, chlorides, cyanides, zinc [9].

The health risk assessment for the consumers of drinking water in Selyatino was conducted on the basis of the data on the chemical composition of the water, delivered by the drinking water supply system of OJSC Gidromontazh Trust.

You can see the results of the calculation of the integrated indicator of the drinking water quality in the table below. We can see from the table that the priority factors of risk are olfactory and reflectory effects and non-cancerogenic risk. Due to the fact that the olfactory and reflectory risks exceed the value of 1, the risk level is unacceptable for the water of Wells № 1, № 5, № 5a. Due to the fact that the non-cancerogenic risk exceeds the value of 1, the risk level is unacceptable for the water of Wells № 4, № 6, № 7, № 8 and Reservoir №3.

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Table 1. The results of the calculation of the integrated indicator of the drinking water quality

Water wells, №	Priority risk	Risk and acceptable risk values dependence	Integrated indicator	Acceptable value
1	olfactory and reflectory effects	7.148	7.886	1
5		9.990	10.862	
5a		9.990	10.844	
4	non-cancerogenic risk	2.984	3.035	
6		1.622	1.948	
7		1.588	1.664	
8		1.914	2.054	
Reservoir 3		1.058	1.113	

Thus, having conducted a health risk assessment for the drinking water supplied by OJSC Gidromontazh Trust in Selyatino, it is possible to draw the following conclusions:

1. In the risk assessment for peroral intake of drinking water containing chemicals with olfactory and reflectory effects, we revealed that the water from Wells No. 1, 5, 5a did not meet the acceptable risk level due to the elevated concentration of iron and high rates of chromaticity. As for the water of Wells No. 4, 6, 7, 8 and Tanks No. 1-2, 3, the risk level was acceptable (less than 2%).

2. Assessing the non-cancerogenic risk when ingesting chemicals with toxicological effect, we detected discrepancy to the acceptable level in Wells No. 4, 6, 7, 8, and also Reservoir No. 3 because of the elevated concentrations of borium and fluorine. In this case, the risk for health in the use of drinking water is estimated as alarming, that is characterized by the growing risk of nonspecific pathology. As to the water from Wells No. 1, 5, 5a and Tank No. 1-2, the non-cancerogenic risk level was recognized as acceptable (less than 5%).

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3. Assessing the total lifelong cancerogenic risk for human health in Selyatino when consuming tap water, it was revealed that the cancerogenic risk level corresponded to the permissible one (less than 10^{-6}).

4. In the integrated assessment of the drinking water quality, it was revealed that the integrated indicators for all the wells and reservoir No. 3 didn't correspond to the admissible values (1). That is connected with the elevated risk levels for olfactory and reflectory effects (Wells 1, 5, 5a) and enhanced non-cancerogenic risk level (Wells № 4, 6, 7, 8, Reservoir № 3).

According to the methodological recommendations on an integrated assessment of drinking water of centralized water supply systems based on the indicators of chemical harmlessness, the revealed exceedance of admissible risk values for at least one of the risk types requires additional measures to regulate water quality [7].

As elevated concentrations of iron, fluorine, barium and borium have been revealed, it is necessary to take measures reducing the concentrations of these substances in the drinking water [10].

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OIL INDUSTRY IN THE UAE AND KAZAKHSTAN: EFFECTS ON THE ENVIRONMENT

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Abstract: The objective of this research is to show the extent of damage to the environment caused by the rising scale of oil production in the oil-rich countries such as the UAE and Kazakhstan on their way to economic success.

Keywords: oil spill, oil extraction, water contamination, marine ecosystem.

Since the discovery of natural resources such as oil and natural gas in the previous pearling area, the economy of the UAE has greatly benefited while the condition of the global environment has shriveled. Same goes for the Republic of Kazakhstan when it rose to prominence within the Eurasian states as one of their biggest exporters of liquid hydrocarbons. In Kazakhstan the combined onshore and offshore proven hydrocarbon reserves have been estimated close to ~30 billion barrels while the UAE's reserves are at 97.8 billion barrels as of 2014 according to the EIA [1]. With all these oil reserves there have been increased activity in the production of daily items that are petrochemical based, most prominent of the list is fuel oil used in power generation and polymer synthesis which is further used in the manufacture of plastic. This is acquired through the process of oil refinery in franctioning columns which is similar to the process of distillation in chemistry

In Kazakhstan there is a huge offshore oil field in the Caspian Sea, called Kashagan which has had a few occurences of oil spills during pilot trials even though there have been no

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regular operations going on at the time. The requirements to the materials used to construct oil extraction platforms located in sea are much stricter, due to high rate of corrosion in salted water.
The negative lessons of catastrophe in the Mexican Gulf with enormous oil spills and the regular oil extraction has been taken into account and it was decided to shift toward 2016. In the UAE, the port of Jebel Ali, a harbor southwest of Dubai and the world's biggest man-made harbor, has had a couple of incidents of oil spills in its territory. The UAE and its neighbouring state Saudi Arabia have been contaminated by the drifting oil slicks resulted from the Gulf War of 2007 [2].

Since oil extraction at marine oil fields occurs through deep water drilling, the risk of oil spill pollution is on the rise making it a difficult task for those cleaning up the aftermath. Another important focus in this paper is the occurrence of oil spills during oil storage and transport.

The cleanup of oil spills includes the following methods:
- Mechanical collection: by use of skimmers, booms, oil-collecting vessels.
- Chemical dispersants: gelling, sinking and absorbing are popular methods.
- In-situ oil burning method, applicable to large oil spills.

The application of these methods is being discussed in terms of their effecitveness in case of water pollution by residual oil, by the products of reactions of chemical agents with water and the products of oil combustion. The main victims of these oil spills are the flora and fauna inhabiting the seas. Offshore drilling destroys ecosystems and fish stock. There is a fall in the number of certain marine species reflected in the red book of endangered animals due to oil spills. Thus, in Northern Caspian Sea area we observe massive death of such unique species as seals. Inhaling the fumes of the burned oil spills in order to clean it up has lead to respiratory problems while ingestion of the water has lead to gastrointestinal inflammations and death due to poisoning. Even corals have suffered, as they rely on the oxygen in water to

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survive and absorb any compound in the water which is immediately resulted in their death and the loss of a living and mating habitat for small fish and plankton.

Over the years many states have made measures in order to prevent oil spills from occuring with the introduction of training programs, awareness campaigns,environmental conferences , etc. The UAE has acquired the help of international marine service companies for aid and has started training local organizations on how to handle oil spills and has built marine conservations for endangered marine biomes. The Republic of Kazakhstan has also been trying to educate the personnel of oil companies about the dangerous outcomes of their work and the precautions needed to be taken.

During the break down of oil slicks in the process of the mechanical oil spill cleanup the increase of nitrogen and phosphorus in the water may occur, which promotes the growth of phytoplankton doubling in number and eventually causing the Algal Bloom, leading to lack of oxygen and thus water pollution type for both fresh and marine water. Such incidents usually occur with the contamination of water with fertilizers but since oil excretes these chemicals when broken down, algal bloom happens after oil spill cleanup.

Through this research it has been deduced that even though the oil spills are under control with the development of the newer technologies of liquidation of oil spills and mitigation of their negative impact on marine ecosystems, marine species are still facing serious threats related to oil spills. Both fishery and offshore oil extraction are important for the economy of each country, but they are undoubtedly incompatible in the same area. While the pollution is common in the oil industries there have been few precautions made in order to avoid such accidents.

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THE RESEARCH RESULTS OF RUSSIAN-ITALIAN ECOLOGICAL SUMMER SCHOOL 2015

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Abstract: The results of the Russian-Italian ecological summer school which was organized in Moscow (July 13th - 18th, 2015) are presented. 10 Italian and 10 Russian students made analysis of the territory near the Osetr river in Lukhovitskiy region and then presented it in the State University of Land Use Planning.

Key words: Ecological summer school, Lukhovitskiy district, Osetr river, hydrological analysis, geomorphologic analysis.

International ecological summer school took place in Lukhovitskiy region (July 13th - 18th,2015) and 4 more days in Moscow on the base of in the State University of Land Use Planning. During these days, 10 Italian students and 10 Russian students conducted geomorphological and hydrological researches of the territory near the Osetr River. [1.p.15]

During the morphological part of practice we used level (nivelir) and rail, different geological and landscape maps and books. To measure hydrological and hydro-chemical, morphometric parameters, we used such devices as: conductivity meter and oximeter, hand-held analyzer, range finder**,** plumb, seconds counter, GPS-receiver and others.

The study area, including the Osetr River, is located in the southeast of the Moscow region, the Osetrinskaya region, in the Zaokskaya district (Fig.1).

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Location of Moscow Oblast in Russia

Location of Lukhovitsy in Moscow Oblast

Scale: 1:350 000 (in 1 cm 3.5 km)

Figure 1. Location of Russian-Italian Summer School [1]

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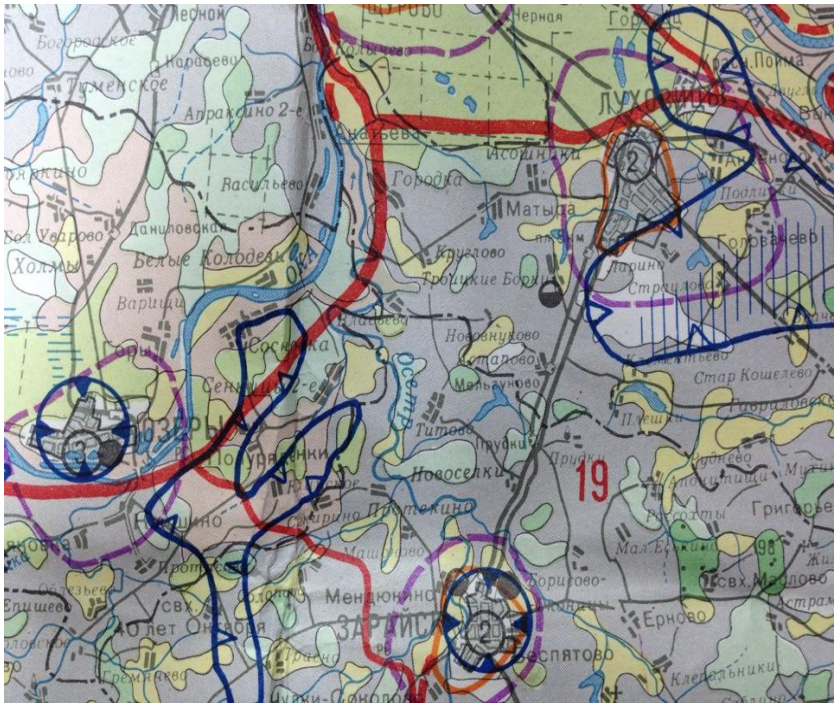
From the point of view of the climate characteristics, the area is situated in the humid continental zone, which is typified by large seasonal temperature differences, with warm to hot (and often humid) summers and cold (sometimes severely cold) winters [2].

Ecological map of Moscow region 1993 year



The area is situated in the sod-podzolic and gray soils region. On the floodplain all the soils are alluvial. They are sandy soils without structure and mixed by river. The soils on the slope of the terrace are also alluvial and primitive. On the water parting, there are sed-calcareous sediments [3].

The landscape is characterized by natural vegetation and anthropological land use.

There are three kinds of plant communities: grasslands, shrubs and woods around the river Osetr. Grasslands occupy the

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14% of the territory; in particular, grassland vegetation covers the flood plain. Water and many nutrients are accumulated there and are used by plants to grow during the summer. The shrubs and woods are constituted principally by the silver birch.

A large amount of territory is cultivated (72%), 6% is urban area and 7% is for recreation activities.

The Osetr River is one of the largest southern tributaries of the Oka and its length is 237 km; the river is characterized by the presence of a great number of meanders [4].

Osetr Valley is heterogeneous in structure and consists of six sections, representing the alternation of contraction and expansion of sites that are very different by morphological features - size, drawing the slopes, development of the terraces, the nature of the channel, and so on [4. P.1].

Osetr Valley is a floodplain and two terraces. Floodplain of Osetr has an average width of 100-300 m at the height of the ledge above the low water level of the river in the middle and lower reaches from 5 to 10 m. Alluvial floodplain facies suite presented loam, sandy loam, sometimes clay, fluvial facies - boulder sands, sandy loams, with rare interbedded gravel [4. P.3].

The surface of the first terrace is relatively smooth and well-preserved. The second terrace remained markedly worse since cracked permanent watercourses. It tilted in different directions as the Osetr, and in its tributaries [4. P.3].

Morphologically it can be assumed that in the place described there are not two, but three terraces. Between the two visible terraces there is probably another one, to the height of the edge of 16-18 m. The boundaries of this garden are masked everywhere, it seems to have been poorly developed or badly blurred [5].

The morphological works were done under the supervision of Volkov V.I. To realize the profile of the area the territory from the river to the last terrace was measured. Then a profile was made with a computer program (Fig.4). The profile represents first 100 meters, just floodplain.

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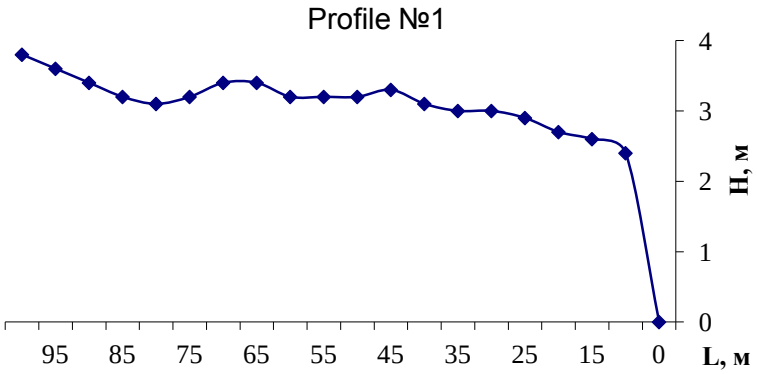

Figure 4. Profile of the floodplain of river Osetr

The hydrological - hydrochemical works were done under the guidance of Professor Shirokova V.A. The rope was stretched between the two banks of the river during the experiment. Then measured parameters like mineralization, conductivity, water temperature, pH, oxygen percentage and mg were calculated meter by meter [6].

Upstream the river Osetr there is the city of Zaraysk with population of more than 50 000 residents. Near Zaraysk there is a working dump. There are 6-12 sewages in Zaraysk, which can influence the ecological situation of the river Osetr [7].

The following results of hydro-chemical investigations of water of the river Osetr in the Moscow region were established:

• The mineralization is established in the range 400-500 mg/l, so it is “fresh water”;

• The water temperature fluctuated throughout all dimensions of 21,2 ° C to 23,3°C;

• The average conductivity of the data is 504.19, the temperature coefficient for the conductivity by 22.25 °C = 0,912;

• Mineralization = 463 mg / l. The hydrocarbonatic class is 200-500 mg/l of mineralization;

• pH = 7,89 so the water is poorly alkalinity;

• The content of dissolved oxygen, O_2% = 52.12%;

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• The contents of dissolved oxygen, O2, mg / L = 5,1 so the class is the fourth.

There were also speed, depth and intensity of water flow measured in two different points – with low river speed (about 0.5-0.6 m/s) and with fast speed (1.3-1.4 m/s). Intensity of water flow in the point with low speed is about 3,3792, however with fast speed 5,4675. This explains the reason of different temperature at these points and also indicates the points where sediments will be accumulated and where they will move forward.

Additionally three different water samples from the Osetr river were analyzed in MOSEKOMONITORING[8]. The samples were taken on 18.07.2015 in the morning:

1) Sample №1 was taken from the point near our station, on the float, 3m from the cost of the river;
2) Sample №2 was from the point downstream from the first one, near the coastline. There were a lot of water plants;
3) Sample №3 was taken from the polygon in Spas-Doshchaty, on the beach.

Sampling was done in the morning. The weather was cloudy, after storm at night. We felt that the water was warmer than the air around. The samples were saved in the fridge during these days.

The results of the analysis showed that the content of chlorides in the water is not high, it is normal for river water. Hardness of the water is medium, so the quality of the water by this parameter is good.

To sum up, the water in the Osetr River in the Lukhovitskiy region is characterized as fresh, hydrocarbonte, poor alkalinity. It is not good for drinking, but it is not also much polluted. Some of the measurements, as oxygen could be higher because of the summer season and high amount of organisms. There can be the influence of the working dump, but to confirm it the hydrochemical analysis should be done in other season and upstream the river.

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Figure 6. Members of Russian-Italian ecological summer school on the Osetr river coast

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Lemenkova P.A.

SUSTAINABILITY OF THE MARINE ENVIRONMENT TOWARDS THE ANTHROPOGENIC IMPACTS IN THE ECOSYSTEM OF THE BARENTS SEA

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Abstract: Among all Arctic seas, the Barents Sea is characterized by its unique environment and high level of the biodiversity. At the same time the Gulf Stream waters transport large amounts of pollutants in the Barents Sea bringing various contaminants and substances from the North Sea. Nowadays, there are in Timan Pechora-Carboniferous basin located in the Barents Sea with 76 oil and gas subsidies, which store a quarter of all Russian oil. The ecological stress on the Barents environment is extremely high. As a result of contamination, the current state of the Arctic environment in the unique area of the Barents Sea may become threatening provided human impact remains at the same level. This article demonstrates the problem of nature resistance towards human impact. It shows negative human impact on the environment. Current geo-ecological situation in the Barents Sea as a unique hydrodynamic system is analyzed. The consideration is given both to the level of negative human impacts on the marine ecosystem as well as to the resistance of nature, i.e. the ability to deal with environmental stress, multiplied by their geographical location in the Arctic climate.

Key Words: marine ecosystems, Barents Sea, marine environment, water pollution, ecological sustainability

Analyzing geoecological situation of the marine basin, particularly such complex as Barents Sea, it is necessary to understand it as a unique hydrodynamic system with specific interaction of meteorological, biochemical and hydrological processes, hierarchical structures and subcomponents and indissoluble connexion with the coastal territory [11, p.38].

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Geographic factors determining natural capability of the ecosystem to resist towards the anthropogenic impacts should be briefly discussed. Geographical features of any water basin is the primary factor which determines the ecological situation of the territory. Even the same anthropogenic pressing under the radical different conditions (e.g., in tropical and polar regions) and in various ecosystems could cause quite different effects [22, p.87]. The geoecological analysis of the marine ecosystems in the Barents Sea presented in this paper is based on the thourough analysis of the information on its geographic and environmental conditions. The following important natural features are analyzed: types of geologic ground, geomorphological structures of the region, e.g. types of the seafloor bottom, coastal shelf area, morphological structures, morphologically similar zones of water areas, borders of the criolithozone, topography of the coast, temperatures of water.

Various natural geographic factors regulate the distribution of the contaminants within the ocean basin, accelerating or breaking the behaviour of chemical processes. That is why an additional background information containing natural geographic components of marine ecosystems is used. Bathymetry plays important role in the environment of the Barents Sea. It controls the status of the ecosystem, as its shelf continues much further than all other seas in Arctic basin [8, p.121]. Having numerous hollows and depressions, steep slopes and submarine mountains, the seafloor of the Barents Sea has complicated bathymetry. In such a way, it creates contamination transfers and places for their accumulation in its deepest parts and submarine canyons. The deepest points and the most intersected seafloor bottom with steeps are notable in the western part of the sea. On the contrary, shallow depths (<50 m) are mostly located on the south in littoral zones of the Pechora Sea and eastern parts of the Barents [12, p.247]. According to this, they represent the most important geomorphological features of the Barents Sea, its coastal

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territories and linear geomorphological characteristics (e.g. morphological structures and geomorphological similar areas).

The hydrological characteristics of the Barents Sea have different features compared to other Arctic seas. Namely, intense income of warm Atlantic waters coming from the Gulf Stream through the western part of the basin via the Norway Sea [24, p.110]. The main direction of the current systems in the Barents Sea can trigger serious ecological problems. Being the most important current of the Barents Sea determining its hydrological regime, it is formed by the Nordcap current, carrying warm and salty water directly from the Atlantic Ocean. That means all the polluted waters of Western Europe may flow directly into the Barents Sea, i.e. the activities of the oil drilling in the Norway Sea and the Sellafield which caused the increase of a-HCH concentrations in the Barents Sea.

Besides a branched system of the warm Nordcap current, the Barents Sea has exchange of waters with the open Arctic Ocean, Kara and White Seas waters which provide the additional inflow of the pollutants. Great bulk of pesticides and polychlorinated biphenyls (PCB's) come into the sea by river flow and land drainage and also by sea currents (e.g. Gulf Stream into the Barents Sea). Understanding how important the oceanological characteristics are for an ecosystem (such as temperature, salinity), one can better realise the behaviour of the contaminants in the waters [23, pp.12-15].

Geological types of the bottom sediments and lithological structures are important features for the ecology of the sea, because the lithological compositions of the ground directly influences the absorbing capabilities of its bottom sediments [13, pp.207-226]. Hence, the processes of absorption and accumulation of pollutants will be much more intensive on the surfaces with prevailing thin-grained structure (e.g. silty sediments). The pollutants themselves will remain in the ground much longer and will be washed out slower than those from the coarse-grained ground [9, p.58]. Accordingly, for instance, shelf

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parts are much more favourable for the absorption of different contaminants. The distribution of the different types of the bottom sediments correlates with the distribution of ^{137}Cs and PCB's contaminations since these water pollutants gather in bottom sediments and are better absorbed by silty sediments than by those with coarse-grained structure (pebble, gravel). In these ones, the concentration of the pollutants is much lesser.

The glacial situation has fundamental importance for the ecology of the Barents Sea. The ice sheet has impact on the formation of the submarine coast slope and its morphological structure. By weakening the intensity of the waving and consequently, their morphological forming forces it creates forming flat slope of the submarine slope where fine-grained silty sediments absorb more substances as compared to the sand. It should be also noted that such natural features as permafrost, excess watering, low temperatures and polar criolithozone reduce tempo of the biochemical processes, i.e. altogether they create favourable conditions for the contaminating of the sea. In that way it leads to the destruction of the ecosystems.

Water solubility of oil and other petroleum products linearly depends on the temperature of water and the distribution of criolythozone. That is why negative biological effects of oil contamination have most negative effect in the polar ecosystems where low temperatures of air and water reduce the speed of biochemical processes even during the summer period. The oil which gets under the ice cover, accumulates in the depressions of its under-surface and is being absorbed by the ice. During ice melting these oil spots are poured out directly into the water. Hence, the ice cover plays important role for the functioning of ecosystems. The borders of complete ice covering in March and September reflect temperature conditions, isotherms of upper water layer in the summer months and possibility of the oil contamination [15, pp.103-110]. Melt of land glaciers polluted by the precipitations or radioactive elements leads to the additional income of pollutants into the sea. Geoecological zoning of the

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Barents Sea is made mentioned above information using main principles of complex geoecological mapping [17, p.73].

The GIS offers tools for the integration of different spatial data and performing complex geographical analysis and research. For mapping a series of ecological maps of the Barents Sea the ArcView was used. This GIS enables to make a dynamic connection between the attribute data containing various characteristics of objects (e.g. the number of concentrations of contaminants) and spatial characteristics of objects [10, p.392]. The standard ArcView-format shapefile as thematic layer was utilized to keep spatial data and attributes.

Various thematic maps and data from different sources containing geographic aspects and ecological factors with impact on the environmental conditions of the Barents Sea were analysed (Fig.1). This enables to create GIS project for mapping using data on the geographic natural specifics of the Barents Sea. All thematic information concerning the environment of the Barents Sea available in the AWI archives were analysed. These included marine geology, geomorphology, climate, hydrological conditions, biological resources, soil of coastal areas, ecological data on emissions and concentrations of contaminants, glacial and ice conditions. All data were visualized as tables.

Furthermore, the GIS ArcView was used to analyse topological thematic layers where all thematic information was stored: the bathymetry of the Barents Sea, coastal lines, glacial areas, different types of bottom sediments, geomorphological characteristics of the seafloor etc. using principles of GIS application for the environmental studies [1, p.83], [2, p.259], [5, p.289], [14, p.45]. The database has been created as a dbf-format file in the ArcViewCatalogue, containing values of the contamination concentrations and their placement in sea basin: ^{137}Cs, PCB's, pesticides as a- and b-HCH, petroleum hydrocarbons, heavy metals (Ni, Cu, Zn, Cd etc.) for different points of the Barents Sea where the water samples were taken.

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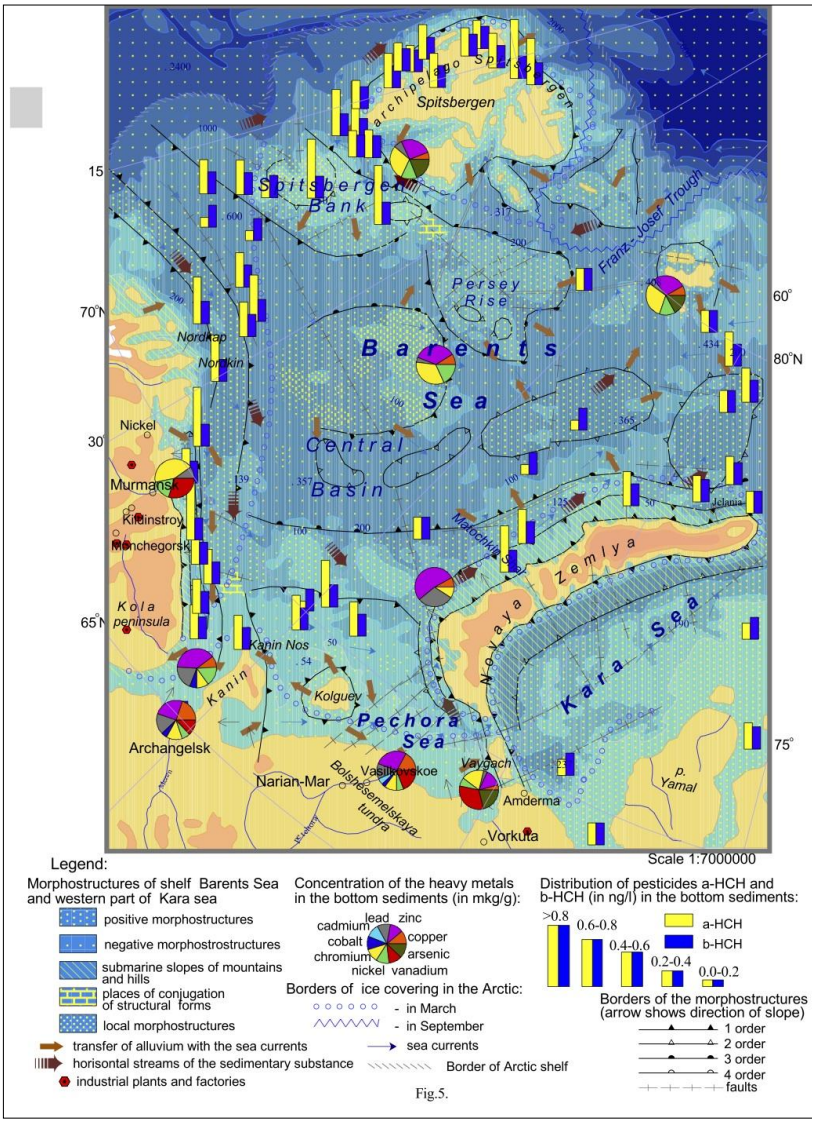

Fig.5.

Fig.1. Distribution of the heavy metals within the Barents Sea.

Thematic maps showing environmental situation in the Barents Sea were created (Fig.1, Fig.2) on the basis of the

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available data and typical cartographic tasks: editing, analysing, combining layers with thematic data, creation and editing of legends and attribute tables, charts, and finally, visualization of layouts. The maps were drawn using ArcView Map on the basis of manuals for GIS mapping in marine and environmental cartography [3, p.62], [6, p.38]. The mapping process comprehended the creation of several thematic layers as 52 shape-files. In this files geographic features of the Barents Sea's environment were visualized, also ecological information of concentration and sources of contaminants, possible ways of their transportation and the accumulation in the bottom of the sea. The layers containing information on geological structure of the ground were compared. The values of different concentrations of the pollutants were analysed. The geological types of the bottom sediments were monitored as the absorption and accumulation of pollutants is much more intensive on the surfaces with dominating silty sediments. At the same time, the pollutants themselves will remain in the ground longer and will be washed out slowly than those on the coarse-grained ground. The regions with dominating fine-grained type of sediments are much more vulnerable, prone to the ecological pressure and destruction of the environment. The areas of the criolithozone expansion are considered for the ecological analysis, since low temperatures have direct impact on the speed and tempo of biochemical reactions.

Geoecological zoning is realized on the basis of the analysis of all available information containing ecological data (e.g. distribution of the contaminants within the sea basin) and geographic background (Fig.2). The shp-files were overlapped, representing environmental situation of the sea as a result of anthropogenic activities and natural geographic forces [19, p.32]. Thus, the geoecological analysis is a summarized assessment of the environmental conditions of the marine ecosystem which is detected nowadays. The identification of the regions was done based on the analysis of the impacts of the separate contaminants

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taking into account geographical features of territories by overlapping GIS layers [7, p.205].

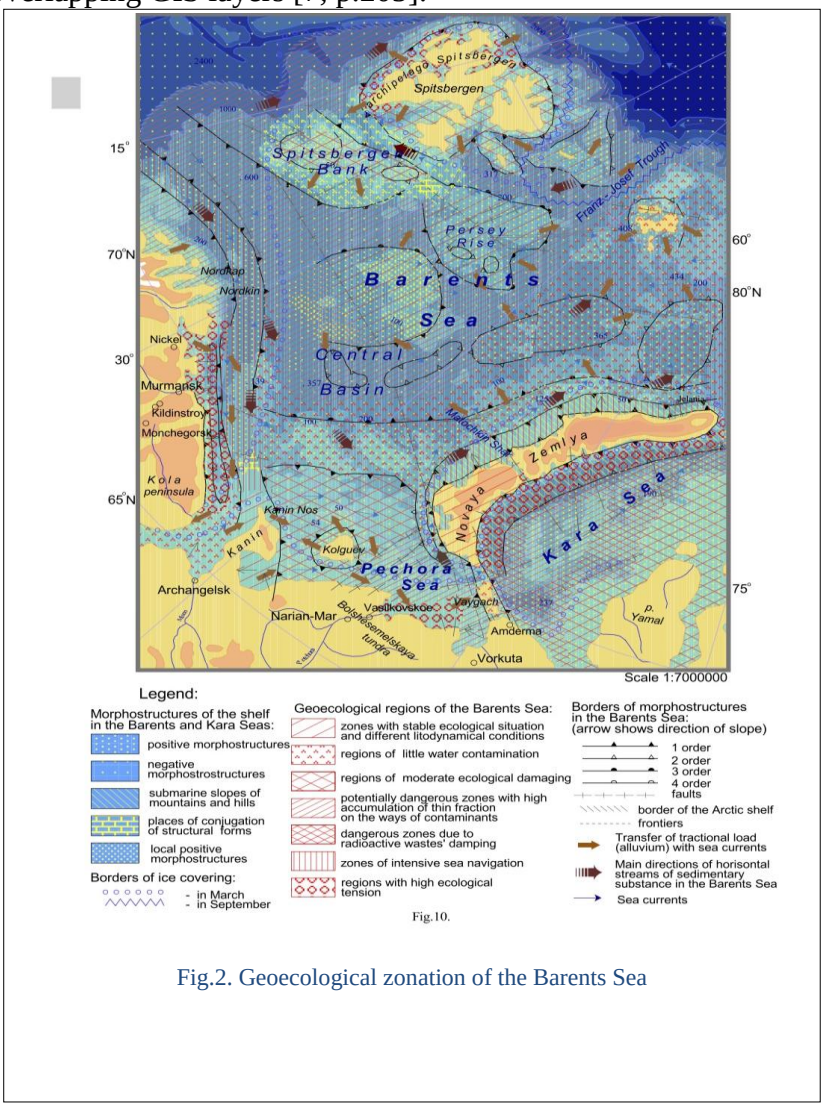

Fig.2. Geoecological zonation of the Barents Sea

In such a way, it influences the ecological status of the marine environment as a whole. Moreover, the coastal and littoral

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regions are separated from open sea areas due to the high concentration of biological productivity and resources which make them more vulnerable compared to the open sea areas.

Final geoecological map (Fig.2) was created using main recommendations for the GIS mapping and environmental zoning [16, p.79], [18, p.68], [20, p.55] as well as examples of the ecological zoning or the priority areas in the Barents Sea. A drawing of the border lines was done based on the geomorphological zoning of the basin [4, p.211], [21, p.35], as similar regions indicate main morphological structures of the region, that appear to be basic areas with equal status. Other differences of the ecological stability or non-stability can be investigated using the same principle, as dominating process of accumulation of the contaminated sediments is directly depending on the seafloor.

Located within polar conditions, the coastal shelf zones have a number of features and characteristics. These include for instance the intensity of ice building process, diminished wave process, thermal abrasion, thermal denudation, solifluction and frosty destruction of coasts. The thermo-abrasive coasts are widespread along the shore of the Arctic. In case of their destruction it becomes a region with one of the most important sources of transport of the sedimentary substances. At least 50% of the Arctic coasts are prone to the abrasion. The abrasion leads to the enormous losses of coasts: environmentally valuable coastal lands are being lost, near-coastal industrial buildings are being destructed, thereby bringing additional input of the contaminants into waters. Denudational coasts are formed by the frozen destruction processes which cause supplementary import of sediments into the basin.

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WASTE WATER DISPOSAL SYSTEM ON A BRIDGE CROSSING: ENVIRONMENTAL ASPECTS OF THE DESIGN AND OPERATION (A CASE STUDY OF TRUBEZH RIVER, YAROSLAVL REGION).

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Abstract. The article is devoted to the best available runoff treatment technology selection. Runoff is generated on the bridge crossing the river Trubezh in Pereslavl-Zalessky district, the Yaroslavl region. The issue of pollutants discharge rationing with taking into account local conditions is also considered.

Key Words: bridges, river Trubezh, storm water runoff, surface runoff, water regime, wastewater treatment, water treatment plants.

There are three basic groups of methods for waste water purification: mechanical methods, aimed at removing water insoluble coarse and fine particles from the water; physic chemical methods, designed to remove dissolved impurities and biological methods for removing contaminants by biological plants and microorganisms.

The basic characteristics of the object influence the choice of treatment technology. The study object is the bridge over the river Trubezh in the Yaroslavl region. Climatic and geographical characteristics of the territory are:

- The river length is 36 km, the width is 25 m, and the depth is 3 m. The river is slow and its flow rate averages 0.4 m/s. The Trubezh is fed mainly by snow melt water [1].
- The highest amount of rainfall is in August [1].

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- The projected bridge is a medium-size bridge crossing. The category of the road running over the bridge is I B. The road is a safe fast road with a flow of vehicles over 14,000 cars a day. The curb-to-curb width is 11.5 m. The sidewalk width is 1 m. Pavement of the bridge is represented by multi-layer asphalt.

Priority pollutants of the surface runoff are oil products and suspended solids, most of which are submitted by fine dust and silicon oxides. Based on this data the treatment plant was selected taking into account criteria for the best available technology (BAT) selecting and allowable discharge standards (ADS) calculation in accordance with the procedure [2]. The data used and results obtained are presented in Table 1.

Table 1.The data for the calculation and the values obtained for ADS

Parameter	Signification
Specific consumption of the runoff, l/day	4,1
The catchment area , F, ha	0,087
The coefficient reflecting the change in the specific water consumption according to the average deviation of the longitudinal section of a road or a bridge , k	1,26
Water discharge runoff, q, m^3/day	0,00087
Flow hydraulic radius , R, m	3
Roughness of the river bed, $n_ш$	0,04
Mixing ratio , γ	0,24
Permitted by the sanitary rules increase of suspended solids in the water body after water discharge , p, g/m3	0,75

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Water flow in the river , Q, m^3 /day	98
The content of suspended solids in the water of a water body to water discharge , b, mg/ l	21,0
MAC_{mo}, g/m^3	0,05
C_f , g /m^3	0,07
Mixing ratio, n	2
C_{asd} for suspended solids, g/m^3	20297,6
C_{asd} for oil products, g/m^3	0,03
MAC_{ss} g/h	**0,74**
MAC_{op} g/h	**0,054**
Gross relief for suspended solids , t/year	**0,0064**
Gross relief for oil products, t/year	**0,0005**

*Indicators that are the finish result of allowable discharge calculation are italicized in the Table. They were used as basic criteria for treatment plant selection.

According to the set of requirements and on the study basis complex treatment plant"Veksa-2M" [3] was chosen as the best available technology of the runoff purification. It is presented at the Russian market and includes a sand trap, a lamellar settler, a coalescing separator, a two-stage sorption filter [3] .This setting allows to clean runoff up to the level of maximum permissible concentration (MPC), which best corresponds to the criteria of BAT and does not exceed the allowable discharge standards (ADS).

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THE RELATIONSHIP BETWEEN RAINFALL AND RUNOFF IN THE BASIN OF RIVER ACHARAS-LATAKIA-SYRIA

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Abstract: This research aims to determine the relationship between precipitation and runoff in the basin of river Acharashir and study the various factors that affect them by building a mathematical model of the basin using GIS and WMS programs.

The importance of such models is in the ease of changing the data without destroying the entire model. We can design a model to simulate different scenarios of possible changes in land use change or soil type in the area of the basin or even climatic changes taking place in our region recently. Such changes affect the size of the flows caused by rainstorms and therefore some of the engineering structures maybe go out of the service because they have been designed on smaller flows.

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This research is important for the future design of any engineering facility in the area of the basin, and in the optimal management of water surface and groundwater.

Key words: rainfall-runoff, flood modeling, WMS, Hydrologic Soil Group.

Introduction. The volume of runoff resulting from precipitation depends on the storm type and severity, duration and direction as well as properties associated with climate of the basin, morphometric properties and storage properties (lakes, ponds, depressions ... etc.)

Changes in land use and climate changes taking place in the world recently are important factors which affect the flow of the watercourses system.

Proper modeling of the relationship of precipitation - runoff requires study of the above factors linked through appropriate software. The runoff caused by rainfall in any river or catchment is considered a basic standard in the engineering constructions of roads, bridges, ferries and other engineering facilities design, and good management of water resources requires the identification of the value of this flow accurately.

The study area location: The areas studied are located in the northern part of the area Jableh, stretching between the basins of the Rumaila from the north and Hwiz from the south, on the east there are agricultural lands and urban areas, on the west by the Mediterranean Sea.

Acharashir River extends between (^{30} 55' 35°) and (12^{*} 10' 36°) to the east, and between (54^{*} 21' 35°) and (27^{*} 24' 35°) in the north, its springs are located at an altitude of 1200 meters in the coastal mountain range.

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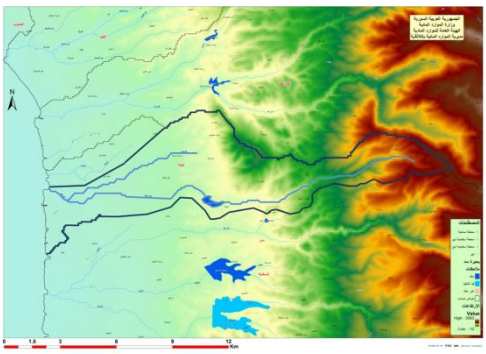


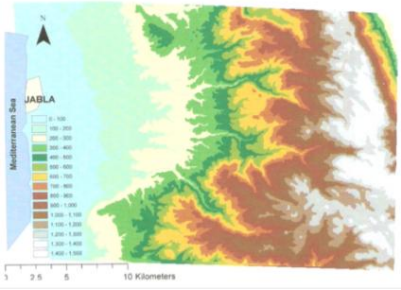
Picture 1. The study area

Research method and tools:

Field study: Includes measuring the flows of the river periodically every period of time and there should be intensified measurements during rainstorms, especially those that have time equal to the concentration time of the basin to be able to draw the hydrograph accurately as we need to collect precipitation data available in previous years.

The desk study: Depends on the software, especially programs GIS and WMS which identify all the necessary data to run the model and determine the catchments. This work includes mainly the construction of a set of layers as follows:

- Numerical Elevation model (can be inferred from the topographic map of the study area).



Picture2.Numerical Elevation model of the study area.

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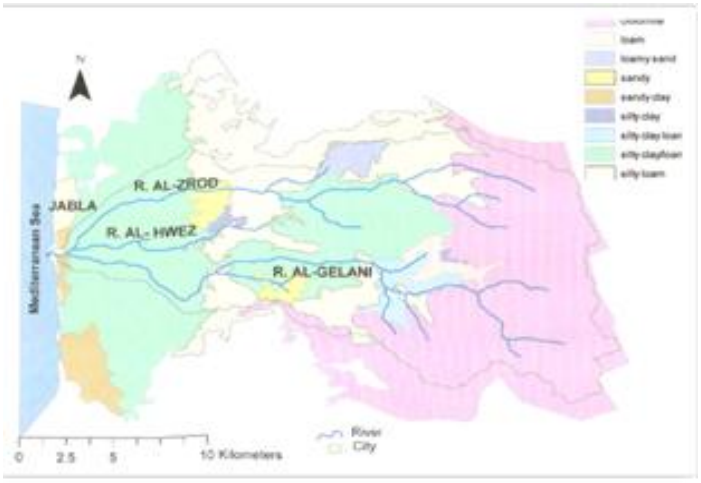
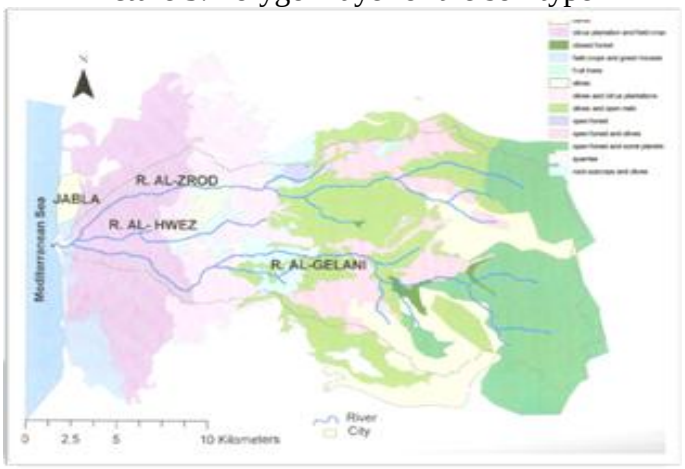


Picture 3. Polygon layer of the soil type



Picture4. Lands use.

Results and discussion:

Through the availability of the layers of catchments with the content of the properties, and layers of the Runoff coefficient and containing Runoff coefficient values for each polygon, Where Ct <25 represents the value of the Runoff coefficient of

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the frequency time is smaller than 25 years and Ct>25 represents a value of frequency times greater than the 25-year.

Picture 5. catchments

Now we can find the runoff coefficient of the catchments in the study area, in addition to runoff coefficient at every point of exit points.

Picture 6. Runoff coefficient

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The runoff coefficient of the catchment can be found according to the following equation (Rational Method):

$$C_B = \frac{\sum C_i * A_i}{\sum A_i}$$

Runoff coefficient values for time to repeat rain storm less than 25 years

R. C. for catchments C_B	R. C. for each polygon C_i	area polygon A_i	NO. polygon i	area basin A	catchment
0.2	0.2	11.16	58	11.16	B8a
0.25	0.31	0.02	22	6.82	B8b
	0.2	5.9	58		
	0.6	0.9	71		
0.3	0.31	1.05	22	7.3	B7a
	0.14	0.02	52		
	0.2	4.7	58		
	0.6	1.54	71		
0.2	0.14	0.6	52	16.83	B7b
	0.2	16	58		
	0.6	0.22	71		
0.29	0.31	3.19	22	12.1	B9a
	0.14	2.65	52		
	0.2	4.07	58		
	0.6	2.2	71		
0.45	0.31	1.03	22	9.64	B9b
	0.14	0.54	52		
	0.2	2.2	58		
	0.6	5.87	71		
0.48	0.31	0.83	22	10	B10a
	0.14	0.51	52		
	0.2	1.81	58		
	0.6	6.86	71		
0.23	0.31	0.47	22	1	B10b
	0.14	0.37	52		
	0.2	0.16	58		
0.34	0.21	1.79	16	11.2	B11a
	0.31	3.16	22		
	0.14	1.57	52		

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	0.2	1.33	58		
	0.6	3.35	71		
0.24	0.31	0.44	22	0.7	B11b
	0.14	0.27	52		
	0.2	0.02	58		
0.21	0.13	2.33	12	20	B12a
	0.23	2.39	21		
	0.31	5	22		
	0.2	2.56	24		
	0.14	6.74	52		
	0.2	0.47	58		
	0.6	0.51	71		
0.26	0.15	0.45	15	2.13	B6b
	0.31	1.43	22		
	0.11	0.2	51		
0.17	0.13	2.11	12	22.08	B14a
	0.15	7.79	15		
	0.14	0.09	17		
	0.18	11.66	20		
	0.4	0.13	33		
	0.11	0.2	51		
	0.14	0.1	52		
0.16	0.14	0.44	17	0.97	B2
	0.18	0.53	20		

- Note through the table that some catchments such as (B14a) contain many polygons (7 polygons) for the Layer of runoff coefficient, and this is due to the diversity of soils in the basin area, as well as to the diversity of vegetation in the area and this diversity is not linked to the space of the basin. This underlines the importance of the detailed study of the catchments.
- As shown in the table variation values of runoff coefficient of basins, which ranged between 0.15 and 0.48 and the values of this variation did not depend on one variable from the variables that influence the runoff coefficient.

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Runoff coefficient values for time to repeat rain storm more than 25 years

R. C. for catchments C_B	R. C. for each polygon C_i	area polygon A_i	NO. polygon i	area basin A	catchment
0.25	0.25	11.16	58	11.16	B8a
0.32	0.41	0.02	22	6.82	B8b
	0.25	5.9	58		
	0.8	0.9	71		
0.39	0.41	1.05	22	7.3	B7a
	0.18	0.02	52		
	0.25	4.7	58		
	0.8	1.54	71		
0.64	0.41	0.83	22	10	B10a
	0.18	0.51	52		
	0.25	1.81	58		
	0.8	6.86	71		
0.45	0.28	1.79	16	11.2	B11a
	0.41	3.16	22		
	0.18	1.57	52		
	0.25	1.33	58		
	0.8	3.35	71		
0.32	0.41	0.44	22	0.7	B11b
	0.18	0.27	52		
	0.25	0.02	58		
0.28	0.18	2.33	12	20	B12a
	0.29	2.39	21		
	0.41	5	22		
	0.25	2.56	24		

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	0.18	6.74	52		
	0.25	0.47	58		
	0.8	0.51	71		
0.34	0.21	0.45	15	2.13	B6b
	0.41	1.43	22		
	0.14	0.2	51		
0.22	0.18	2.11	12	22.08	B14a
	0.21	7.79	15		
	0.2	0.09	17		
	0.24	11.66	20		
	0.5	0.13	33		
	0.14	0.2	51		
	0.18	0.1	52		
0.22	0.2	0.44	17	0.97	B2
	0.24	0.53	20		

Through the previous tables shows effect of repeat the rain storm, where runoff coefficient values ranged between 0.21 and 0.64, where the lower value for the runoff coefficient increased from 0.15 to 0.21, while the highest value increased from 0.48 to 0.64.

After calculating runoff coefficient values for the catchments, calculate the runoff coefficient at the outlet points, as each outlet point may be the discharge point for more than a catchment, it is done according to the following equation:

$$C = \frac{\sum C_{Bi} * A_i}{\sum A_i}$$

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Runoff coefficient for catchments and exit points for the time of recurrence of the storm rain more than 25 years					Runoff coefficient for catchments and outlets for the time of recurrence of the storm rain less than 25 years			
R. C. for outlets	**R. C. for each catchment**	**Partial catchment**	**outlet**		**R. C. for outlets Ct<25**	**R. C. for each catchment Ct<25**	**Partial catchment**	**outlet**
0.28	0.25	B8a	8C		0.22	0.2	B8a	8C
	0.32	B8b				0.25	B8b	
0.29	0.39	B7a	7C		0.23	0.3	B7a	7C
	0.25	B7b				0.2	B7b	
0.35	0.37	B9a	9C		0.28	0.29	B9a	9C
	0.6	B9b				0.45	B9b	
0.39	0.64	B10a	10C		0.3	0.48	B10a	10C
	0.3	B10b				0.23	B10b	
0.4	0.45	B11a	11C		0.3	0.34	B11a	11C
	0.32	B11b				0.24	B11b	
0.37	0.28	B12a	12C		0.28	0.21	B12a	12C
	0.29	B12b				0.23	B12b	
0.28	0.21	B13a	13C		0.21	0.15	B13a	13C
	0.3	B13b				0.23	B13b	
0.52	0.35	B3a	3C		0.48	0.27	B3a	3C
	0.63	B3b				0.48	B3b	
0.4	0.31	B4a	4C		0.35	0.24	B4a	4C
	0.43	B4b				0.33	B4b	
0.38	0.32	B5a	5C		0.32	0.25	B5a	5C
	0.39	B5b				0.3	B5b	
0.37	0.22	B6a	6C		0.31	0.16	B6a	6C
	0.34	B6b				0.26	B6b	
0.32	0.22	B14a	14C		0.26	0.17	B14a	14C
	0.24	B14b				0.18	B14b	
0.34	0.24	B15a	15C		0.26	0.18	B15a	15C
	0.26	B15b				0.2	B15b	
0.34	0.22	B2	2C		0.26	0.16	B2	2C

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Conclusions:

There is a large variation in the runoff coefficient values between basins covered by forests and fruit trees, and those barren which show the importance of the detailed study of the values of this factor for small catchments. The adoption of digital map to runoff coefficient of the small catchments will facilitate the work of the designer or researcher in the future, because of the inability to provide places for measuring the abundance in each small catchment, and therefore can depend on the values of the runoff coefficient in these basins to calculate the designing abundance by logical way.

Recommendations. To study the effect of increasing urbanization in rural areas and changing land use; to increase the number of measurement stations on the rivers, fluids and make it automated and intensify readings during rainstorms; to continue research to develop maps representing the runoff coefficient values to the Syrian Coast basin.

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MONITOREO AMBIENTAL Y EVALUACIÓN DE LOS DERRAMES DE PETRÓLEO EN ZONAS MARÍTIMAS

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Abstract: This article describes the environmental monitoring of the consequences of the worst oil accidents in the Gulf of Mexico. Disposal

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methods of marine oil spills are compared with each other.

Key words: Gulf of Mexico, ecology, oil, environmental monitoring.

Resumen: El presente artículo describe el monitoreo ambiental de las consecuencias de los peores accidentes petroleros en el Golfo de México. Se comparan entre si los métodos de eliminación de los derrames marinos de petróleo están comparados.

Palabras clave: Golfo de México, ecología, petróleo, monitoreo ambiental.

El monitoreo ambiental de los resultados del accidente de la plataforma petrolera «*Deepwater Horizon»* mostró tremendo daño que causó este derrame de petróleo. De acuerdo con la agencia de los Estados Unidos, cerca de 400 especies de animales fueron dañadas durante la catástrofe [1]. *Pero hay que tener en cuenta los resultados de un* monitoreo de aves hecho en España: *todas las aves salvadas murieron en los siguientes 2-5 meces.*

Veremos el impacto en los organismos marinos de la contaminación marina en los derrames de petróleo en el Golfo de México en las aguas territoriales del México.

Después del accidente, en una escala sin precedentes (para este tiempo) en el pozo "Ixtoc-I" hace treinta años, la empresa petrolera mexicana Pemex se enfrentó a la realidad que no existen ni métodos ni maquinaria para la recolección y retención de derrames.

Por lo tanto, como consecuencia del accidente ocurrido en la "Ixtoc-I" se empezaron las investigaciones del estado ecológico de las aguas del Golfo de México lo que se convirtió en un permanente monitoreo del territorio marítimo mexicano, esto permitió hacer una base de datos del estado de la cuenca de agua en este territorio, lo que permite establecer los parámetros comparativos para determinar los efectos del derrame de petróleo sobre los organismos vivos de la zona.

Cuando el petróleo se derrama en el mar, junto con la

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eliminación de los resultados del accidente (tomar el control de derrame de petróleo, los trabajos de restricción de la expansión de la mancha de petróleo, los trabajos para limpiar y restaurar el área afectada del océano y la costa), al mismo tiempo se hacen los monitoréos ambientales constantes para determinar la naturaleza del daño (tierra y agua) desarrollados por diferentes centros de investigación (como la División Académica de Ciencias Biológicas de la UJAT; el Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional CINVESTAV-IPN; Instituto de Ciencias del Mar y Limnología, UNAM bajo la guía de RMSO y otros) para determinar " si el derrame de petróleo trajo cambios significativos en el medio ambiente a corto plazo" [2].

Veamos las acciones de la compañía en el monitoreo del estado de la contaminación del ambiente marítimo en el siguiente caso del derrame del petróleo en 2007 en la plataforma marítima Kab-121 (16500 barriles de Crudo ligero 37.5° API) [3].

El informe sobre los resultados de la evaluación del impacto del derrame de petróleo en Kab-121 contenía siguentes parámetros:

1. físico-químicos del suelo marino.
2. los contaminantes en sedimentos y peces.
3. efectos toxicológicos sobre los peces.
4. histopatología en el pescado:
5. detección y cuantificación de las bacterias que degradan hidrocarburos.
6. bentos (infauna) en los sedimentos marinos.

El infrome concluye que hay signos claros de presión sobre el medio ambiente, aunque es imposible decir que esto se debe solo al accidente en la Kab-121; la carga sobre el medio ambiente, lo más probable, es de carácter crónico; dos zonas tienen signos de un impacto negativo más fuerte: cerca del pozo y alrededor de la boca de los ríos, lo que sugiere que la causa de la contaminación es multifactorial [2; 4].

Conclusión

Sin capacidad de abandonar a los recursos petroleros se

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desarrollan varios métodos y tecnologías para proteger la biosfera de contaminación por hidrocarburos. Hoy en día en ciertos casos, algunos de estos métodos son relativamente eficaces. Sin embargo, bajo las condiciones de los océanos, estos métodos no siempre pueden ser utilizados.

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EL DESARROLLO DEL SUBSUELO DEL GOLFO DE MÉXICO

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Resumen: El subsuelo del Golfo de México esta investigado en el articulo presente como el objetivo de exploracion de las reservas de petroleo, en concreto, se centra en la tectónica salina y la plasticidad de la sal. Se discuten recomendaciones para la industria petrolera para afectar lo menos posible a la ecología marina.

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Palabras clave: Golfo de México, ecología, petróleo, tectónica salina, plasticidad de la sal, accidentes petroleros.

Abstract: The subsoil of the Gulf of Mexico as the goal of exploration of oil reserves is investigated, specifically focusing on salt tectonics and plasticity of salt. Recommendations for the oil industry to affect as little as possible to marine ecology are discussed.

Key words: Gulf of Mexico, ecology, oil, salt tectonics, plasticity of salt, oil accidents

Riesgo ecológico del desarrollo del subsuelo del Golfo de México. Con el rápido avance del desarrollo del Golfo de México profundo, el entendimiento de la estructura del subsuelo y de los procesos que ocurren en ellos cada vez es más completo y aterrador, como en el campo de la ecología. Se hace evidente que la explotación forzada del subsuelo del Golfo de México es peligrosa a un nivel inimaginable antes. La cuenca del Golfo de México es muy rica en petróleo. La puntuación de los pozos perforados en el Golfo ya va en cientos de miles, mientras el número de las plataformas de perforación en aguas profundas en los miles. Tal impacto sobre el subsuelo puede conducir a los desplazamientos de las formaciones geológicas [1].

El proceso de desplazamiento de sal muy plástica hacia el agua profunda provoca los deslizamientos de tierra bajo el agua y desplaza secciones de suelo marino del Golfo de México. Esto y la presión anormalmente alta en ciertos yacimientos de aguas profundas provocan accidentes y desastres ambientales en estas aguas, como el derrame de petróleo por el accidente de la plataforma petrolera *Deepwater Horizon* (2010) dando lugar a situaciones de emergencia ambiental en el Golfo, así como muchos otros "más pequeños" accidentes:

- 16.11.2012 – de la empresa *Black Elk Energy*;
- 21.11.2012 – de la plataforma petrolera *Echo Platform*, propiedad de la empresa *Fieldwood Energy*;

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- 4.07.2013 – en el proceso de liquidación del pozo de fondo antiguo *Walter Well,* perforado en los años 70;
- 23.07.2013 – de la plataforma petrolera *Hercules;*
- El pozo *Taylor* (propiedad de *Taylor Energy Company*) emite derrame del petróleo ya 9 años seguidos;
- 1.04.2015 – de la plataforma petrolera Abkatún A-Permanente (Pemex, México) en el yacimiento Sonda de Campeche.

Las nuevas tecnologías para la ecología del Golfo de México. El propósito de la actividad petrolera en el Golfo – es la explotación del subsuelo petrolífero sin "destruir todo a su paso". Las nuevas tecnologías usadas por la industria petrolera para este fin son productos del proceso de rápido desarrollo de la explotación de los recursos minerales del Golfo. La dirección de desarrollo de la tecnología es de varios niveles: desde la mejora de la seguridad de las tecnologías de perforación y terminación de pozos hasta las tecnologías de respuesta a derrame y vigilancia del medio ambiente.

Un ejemplo es el robot maríno *Protei* desarrollado para recoger petróleo de la superficie del agua – está diseñado para hacer frente a las catástrofes tipo del 2010, es capaz de limpiar la superficie del mar recogiendo el petróleo derramado con su larga "cola" [2].

En cuanto a la vigilancia ambiental en el Golfo de México – se hace y en México y en EU. Así, por ejemplo, en Estados Unidos en los últimos años: una organización no lucrativa de conservación de la fauna marina *Sea Shepherd* junto con *Ocean Alliance* puso en marcha en el 2014 la compañía Toxicidad del Golfo de México para capturar los efectos del derrame de petróleo de *Deepwater Horizon* (hoy *Sea Shepherd* y *Ocean Alliance* – son únicas organizaciones en el mundo que realizan los estudios toxicológicos a largo plazo para evaluar el impacto del petróleo y dispersantes en los habitantes del Golfo de México).

Conclusión. El desarrollo del Golfo de México levanta nuevas preguntas. La explotación del Golfo rico en petróleo y gas debe ser lo más seguro posible. El desarrollo de las nuevas tecnologías está enfocado en esto. No todos los problemas se han resuelto, pero

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muchos especialistas están trabajando para encontrar las mejores soluciones.

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L'EVALUATION DU DEGRÉ DE POLLUTION DE L'ENVIRONNEMENT MARIN DE LA CÔTE D'IVOIRE PAR LES HYDROCARBURES AROMATIQUES POLYCYCLIQUES ET PESTICIDES DU AU DÉCÈS MASSIVES DES POISSONS

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Résumé. Cet article a pour but de mettre en exergue l'impact de l'utitilsation des pesticides et de l'extraction des hydrocarbures aux abords d'une région. Dans ce contexte, les villes de Jaqueville et de Dabou constitueront les localités où nous allons prélever des échantillons, les analyser au laboratoires et interpréter les résultats obtenus. Notre choix s'est porté sur ces deux villes compte tenu du fait qu'en mai 2013, des mortalités brusques et massives de poissons sont survenues dans la lagune Ebrié au niveau de ces 2 localités. Ces 20

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dernières années ont vu une forte aggravation des relations entre la nature et la société. D'une part, les besoins croissants de la population entraînent la nécessité d'une augmentation des activités sur l'environnement, d'autre part l'influence des activités humaines sur l'environnement entraîne une forte détérioration de ce milieu. Pour les résidents de la zone côtière de la Côte-d'Ivoire, les ressources biologiques, plus précisément les fruits de mer, jouent un rôle primordial dans le régime alimentaire de la population représentant plus de 65% de la consommation locale.

Abstract. For residents of the Ivory Coast coastal zone, biological resources, more precisely seafood, play a major role in the diet of the population and they represent over 65% of local consumption. This article aims to highlight the impact of the utilization of pesticides and the extraction of hydrocarbons on the outskirts of the localities of Jaqueville and Dabou in Ivory Cost. Our choice is based on the fact that in may 2013 a sudden and massive death of fishes occurred in the Ebrié lagoon nearby. Samples were taken, analyzed in the lab and the obtained results were interpreted showing the increased human impact on the environment. These last 20 years have seen a sharp worsening of relations between nature and society.

Mots clés: environnement marin, pesticides, hydrocarbures aromatiques polycycliques, chromatrographie liquide, chair de poisson, sédiments, échantillons d'eau.

Key words: marine environment, pesticides, polycyclic aromatic hydrocarbons, liquid chromatrographie, flesh of fish, sediments, water samples.

Tout le monde connaît l'importance sociale et économique de la pêche dans le monde surtout en Afrique. La pêche contribue à la sécurité alimentaire, à la création de nouveaux emplois, et à la croissance économique des pays. En Afrique de l'Ouest, la consommation annuelle moyenne du poisson par habitant est estimé à 9,2 kg [1, p.2]. Les importations des ressources halieutiques constituent environ 50% de la consommation au Togo, 73% en Côte-d'Ivoire et 61% au Burkina Faso [2, p.2]. Sur le côté de l'offre, l'épuisement des stocks en raison de la surpêche et de la pollution de l'eau oblige la plupart des pays de la sous-région à se tourner vers les importations pour recourir aux

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besoins locaux. A l'exception du Nigéria, il convient également de noter que l'aquaculture, qui pourrait compenser le manque de poissons dans les eaux intérieures et dans la mer reste encore à l'état embryonnaire dans la plupart des pays de la sous- région.

Contexte et Méthodologie.

L'échantillonnage et les analyses des prélèvements de la période du 02 juin 2013 au 12 Aout 2015 sur les différents sites sinistrés de Jacqueville et de Dabou ont pour objectif final de suivre l'évolution des polluants identifiés lors de la première phase du constat des nuisances et d'évaluer si possible la durée de dégradation conforme à la Norme de Qualité Environnementale (NQE). Par contre l'objectif principal de la première mission du 03 et du 04 juin 2013 qui était d'identifier les causes et les sources éventuelles du sinistre sur les différents sites, notamment les polluants impliqués tels que les HAPs et les pesticides, a permis d'écarter les prélèvements pour des analyses de nitrates et de nitrites qui se sont révélés conformes à la NQE lors des premières séries d'analyses. Les méthodes d'analyse par chromatographie liquide de haute performance et de spectrophotométrie ont été utilisées de nouveau pour détecter, identifier et doser les contaminants dans les différentes matrices suspectes. Nous nous sommes référés ensuite à la Norme de Qualité Environnementale (NQE) qui correspond à la concentration maximale admissible à ne pas dépasser si l'on veut sauvegarder la faune aquatique. La NQE est issue de la DIRECTIVE 2008/105/CE du parlement Europeen du 16 décembre 2008. Nous sommes également référés au décret n° 2-97-787 du 4 février 1998 relatif aux normes de qualité des eaux en particulier des eaux tropicales destinées à la pisciculture et à l'inventaire du degré de pollution des eaux du Maroc. Il est à noter que la Côte d'Ivoire n'a pas encore validé et adopté de NQE pour ces eaux.

RECHERCHE DE TRACES DE NUTRIMENTS POUVANT PROVOQUER LE MANQUE D'OXYGENES

	Analytes	Conc.(mg/L)	NQE

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		±0.01	mg/l
EAU BASSIN COUVERT– JACQUEVILLE	Nitrate	25.2 ±0.04	50
	Nitrite	0.04 ±0.002	1
EAU ENCLOS GENITEUR-2– JACQUEVILLE	Nitrate	25.2 ±0.04	50
	Nitrite	0.04 ±0.002	1
EAU ETANG ALEVINS– JACQUEVILLE	Nitrate	16.13 ±0.035	50
	Nitrite	0.06 ±0.001	1
EAU gbougbo– Dabou	Nitrate	12.05 ±0.015	50
	Nitrite	0.09 ±0.0011	1

Observations : Les traces de nitrate et de nitrite détectées ne présentent pas de risque majeur par rapport au référentiel de la Norme de Qualité Environnementale (NQE) et des recommandations de la qualité des eaux tropicales piscicoles.

LES HYDROCARBURES AROMATIQUES POLYCYCLIQUES (HAP) : Intoxications chroniques et aigües. Ce sont des molécules ubiquitaires qui se rencontrent à l'état naturel dans les cours d'eau. Les activités anthropiques, particulièrement l'industrie du pétrole, les combustions incomplètes et la fossilisation sont les principales sources de production des HAP dans l'écosystème aquatique. Les risques les plus importants liés aux HAP sont leurs effets mutagènes et cancérogènes [3]. En effet, certains d'entre eux ont été classés comme cancérogènes probables ou possibles chez l'humain par le Centre International de Recherche sur le Cancer (CIRC). Très toxique pour les organismes aquatiques, ils peuvent entraîner des effets néfastes à long terme pour l'environnement aquatique [4, p.5]. Des traces de Benzo(a)pyrène qui est l'un des éléments les plus toxiques se trouvent dans tous les échantillons d'eau et ils

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dépassent largement la NQE. En outre, la présence d'autres groupes de molécules pourrait potentialiser leurs effets toxiques.

Résultats des Hydrocarbures Aromatiques Polycycliques (HAP).

Tableau 1.Concentration moyenne des HAP dans l'eau

	Conc.moyenne HAP dans l'eau (Jaqueville) mg/l	Conc.moyenne HAP dans l'eau (Dabou) mg/l
Expédition 1 02-03 juin 2013	12.28	6.196
Expédition 3 18 juillet 2013	0.0032	0.00473
Expédition 4 05 août 2013	0.00031	0.00070
Expédition 5 12 août 2015	0.02886	0.00323

Tableau 2. Concentration moyenne des HAP dans la chair des poissons.

	Conc.moyenne HAP dans la chair des poissons (Jaqueville) mg/l	Conc. moyenne HAP dans la chair des poissons (Dabou) mg/l
Expédition 2 02 juillet 2013	3.9155	3.2085
Expédition 3 18 juillet 2013	1.960	4.798
Expédition 4 05 août 2013	0.04570	0.00917
Expédition 5 12 août 2015	0.78986	0.29995
Expédition 5 Concentration dans les crabes (femelle)		1,663044183
Expédition 5 Concentration dans les crabes (femelles)		0,503146694

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Expédition 5 Concentration dans les crevettes		0,524427431

Tableau3. Concentration moyenne des HAP dans les sédiments.

	Concentration moyenne HAP dans les sédiments (Jaqueville) mg/l	Concentration moyenne HAP dans les sédiments (Dabou) mg/l
Expédition 2 02 juillet 2013	2.380	-
Expédition 3 18 juillet 2013	0.042502	0.042440
Expédition 4 05 août 2013	0.02261	0.04909

Interprétation des résultats.

Des traces de HAP ont été détectées dans tous les échantillons. Cependant les traces du fluoranthène, pyrène et du benzo[a]pyrène, sont les plus répandues dans les eaux des deux régions avec des taux de présence bien plus élévés que les autres HAP. En revanche, pendant que diminue la proportion de la présence des molécules de benzo[a]pyrène et de fluoranthène dans des échantillons d'eau qui ont été saisis sur 2 ans, la proportion de présence des molécules de pyrène dans les échantillons d'eau augmente.

En ce qui concerne le taux de présence des HAP dans le corps du poisson, les molécules de fluoranthène prédominent à Jaqueville et celles de pyrène le font à Dabou. Lors de notre première expédition (02-03 juin 2013), les valeurs des concentrations des HAP dans presque tous les échantillons dépassaient des milliers de fois les normes internationales requises. En outre les concentrations des différentes molécules HAPs détectées dans les matrices d'eaux, de sédiments et de poisson lors des autres expéditions de l'année 2013 ont diminué

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progressivement par rapport aux premiers résultats analytiques des 02 et 03 juin 2013.

Cependant lors de notre cinquième expédition qui a eu lieu en 2015 soit deux ans après nos quatres premières expéditions, nous avons constaté que la concentration des HAP qui avait tendance à baisser lors des précédentes expéditions dans les différentes matrices a tendance une fois de plus à augmenter. Dans tout les cas, nous constatons que les valeurs des concentrations des HAP dans l'eau, dans la chair des poissons et dans les sédiments dépassent largement la NQE.

PESTICIDES (Herbicides, Insecticides et Rodonticides). De nos jours, les pesticides sont particulièrement utilisés dans le domaine de l'agriculture. Parmi eux on distingue :

- Les herbicides qui sont utilisés pour lutter contre les plantes parasites (ou « mauvaise herbes »), destinées à détruire ou à limiter la croissance des végétaux.
- Les fongicides qui ont été conçu exclusivement pour tuer des champignons parasites des végétaux.
- Les insecticides qui ont pour fonction de tuer les insectes, leurs larves et/ou leurs œufs.
- Les autres pesticides qui luttent contre les limaces (les molluscicides), les rongeurs (les rodenticides), etc. [5, p.8].

Bref, il existe des pesticides contre tout ce qui peut nuire à l'agriculture intensive.

Tableau 8. Concentration des pesticides dans le milieu marin.

	Concentration moyenne des pesticides dans l'eau (Jaqueville) mg/l.	Concentration moyenne des pesticides dans l'eau (Dabou) mg/l.
Expédition 1 02-03 juin 2013	2.620	3.040
Expédition 2	1.068	0.183

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02 juillet 2013		
Expédition 3 18 juillet 2013	0.117	0.072
Expédition 4 05 aout 2013	2.502	4.624

Tableau 9.Concentration des pesticides dans la chair des poissons.

	Concentration moyenne des pesticides dans la chair des poissons (Jaqueville) mg/kg.	Concentration moyenne des pesticides dans la chair des poissons (Dabou) mg/kg.
Expédition 1 02-03 juin 2013	3.530	2.160
Expédition 2 02 juillet 2013	1.809	0.019
Expédition 3 18 juillet 2013	1.134	0.110
Expédition 4 05 aout 2013	2.390	1.981

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Tableau 10.Concentration des pesticides dans les sédiments.

	Concentration moyenne des pesticides dans les sédiments
Expédition 2 02 juillet 2013	0.441
Expédition 3 18 juillet 2013	1.470
Expédition 4 05 aout 2013	2.563

Interprétation des résultats.

Parmi les échantillons prélévés lors de nos différentes expéditions, nous remarquons la présence de 3/4 de pesticides non autorisés (NA), dont l'utilisation est strictement interdite en Côte-d'Ivoire en raison de leur toxicité très élevée. La présence de pesticides comme la cyanazine pose une réelle menace pour la survie des créatures qui vivent dans le milieu aquatique. Comme dans les prélèvements du mois de juin ce sont pratiquement les mêmes herbicides (Triazines, Azotés) et insecticides (organophosphorés (Clhorfenvinphos), carbamate (Aldicarb)) ou encore un rodonticide (Crimidine) qui ont été également identifiés dans la grande majorité des échantillons d'eaux, de poissons et de sédiments recueillis à Jaqueville et à Dabou. Dans les eaux de surfaces la NQE oblige que la somme des pesticides doit être inférieure ou égale à 0,5 µg/l. Il est à noter que les concentrations enregistrées lors des autres expéditions restent significativement basses par rapport à celles des prélèvements du 02 et 03 juin (Cf. figure 4 &5). Le pourcentage de la présence des molécules d'urée (fenuron métoxuron, monyuron), triazine (Cyanazine, simazine, en particulier l'atrazine) et les carbamates (aldicarbe) dont l'utilisation est désormais interdite dans l'agriculture en raison de la toxicité très élévée, est beaucoup plus élévé que la concentration des autres pesticides présents dans des échantillons d'eau et dans la chair des poissons.

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Conclusion. Suite aux résultats de ces séries d'analyses, nous constatons toujours que les concentrations des polluants dans les échantillons d'eaux, de sédiments et de poissons ne sont pas conformes à celles des NQE recommandées. Cependant il est important de noter qu'il y a une baisse significative des concentrations des polluants dans toutes les matrices due au processus de biodégradation et de dilution au cours de l'année 2013.

En aout 2015, nous avons effectué une cinquième expédition pour observer la tendance de la concentration des HAP dans les différentes matrices. Malheureusement, on a noté une légère hausse des concentrations des HAP par rapport aux années précédentes. D'une part, l'utilisation des pesticides dans l'agriculture est très utile pour les humains, car ils protègent les plantes contre les agents nuisibles et peuvent augmenter la qualité et la quantité de la production dans les plantations. Mais d'autre part, dans presque tous les échantillons prélevés les valeurs des pesticides identifiés dépassent largement les limites autorisées. Les mêmes risques évoqués lors du constat du sinistre demeurent toujours, notamment les intoxications aiguës ou chroniques de la population et les menaces sur la sauvegarde de la vie aquatique. Il est donc à conseiller à l'autorité compétente de maintenir les mesures conservatoires déjà prises et de poursuivre les prélèvements et l'échantillonnage afin de pouvoir identifier la période propice de conformité des valeurs des matrices bioindicatrices avec celles de la NQE (référentiel). Enfin il est primordial d'approfondir et d'étendre la zone d'enquête pour identifier les sources ou les origines éventuelles de cette pollution pour prévenir d'autres sinistres.

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SOIL CONTAMINATION AND LANDSCAPE RESEARCH

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THE RELATIONSHIP BETWEEN ABIOTIC FACTORS AND PLANT LIFE

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Abstract: Certain abiotic factors create favorable areas for the growth of indicator plants. Therefore, by counting the abundance of such plants it is possible to estimate the ecological factors that are characteristic for the given area.

Key words: abiotic, biotic, ecological factors, Ellenberg, Ellenberg Scale, plant, plant life.

Any area - such as a swamp, forest or meadow – can be defined by its physical and chemical processes. These create factors, for example, soil density, air moisture, lighting and so forth. Such factors are called abiotic, as they are caused by non-living things. The different combinations of these factors create different favorable conditions for the growth of plants.

Some species of plants can serve as indicators. The abundance or lack of a certain plant species can help determine abiotic factors in a certain area. By analyzing the plant life we can evaluate several ecological factors, such as soil acidity, air pollution or sun lighting of an area.

This biotic–abiotic relationship forms the basis of Ellenberg's ecological scale. According to this scale, each plant species is given an indicator value, based on its preference of certain ecological factors. For example, a value of 1 indicates that

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the species prefers arid locations, whereas a value of 12 would indicate that the plant is continuously or periodically submerged.

Knowing the projective cover of each plant species in the area, it is possible to determine the approximate parameters of lighting, soil moisture, soil acidity and mineral nitrogen content of the soil. [1, p. 27]

This is accomplished in several steps. First, a list of all plant species for the area is made. Second, each species is given a value correlating to the abundance and four values, in accordance with the ecological scale, for each of the four factors. Next, each of these factor values is multiplied separately by the abundance value. The sum of all the products of all the species (each factor separately) is then divided by the sum of all abundance values. In the end, the number values stand as indicators for each ecological factor that will characterize the area.

For example, we have a comparison of two areas of two different upland meadows. The first meadow is located in the Staritskiy Region, Tver Oblast. The second meadow is located in Podolsk Region, Moscow Oblast.

Table 1. Ecological factors for two regions: A.1- Staritskiy Region; A.2 – Podolsk Region.

	Lighting (L)	**Moisture (F)**	**Acidity (R)**	**Mineral nitrogen content (N)**
A.1	7	5	3	2
A.2	6	5	3	5

The ecological factors for both territories are as follows: light (L) – 6-7 – full sun lighting, less than 30% of the area is shadowed; soil moisture (F) – 5 – soils are quite moisturized, so-called “fresh” or cool to the touch; acidity (R) – 3 – soils have high acidity levels; soil richness in mineral nitrate – 2 and 5 (soils in Area 2 are more rich in mineral nitrate than soils in Area 1).

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Soil that is rich in mineral nitrate in preferred by Fabaceae, more commonly known as the bean family. During the field work in the example above, plants were additionally cut, dried and sorted in both areas. This was done to double-check the results achieved using the scale. The plants of each area were sorted into four groups, including Fabaceae. In comparison, the amount of Fabaceae plants in Area 2 was at least twice the amount in Area one. Area 2 had an abundance of another plant known to prefer nitrogen-rich soils – the nettle, or Urtica dioica.

The Ellenberg Scale can be used to determine other factors, such as temperature, continentality, pH and salinity. [2, p.18] The scale can be used not only in meadows but, for example, in forests and valleys. It should also be noted, that the larger the area taken for the plant abundance count, the more accurate the result. The scale is designed for European plants.

This method has some advantages – it is quite accurate and relatively simple in its usage. Once again, it may be used in different areas, not only upland meadows. All that is needed is to determine the abundance of each plant species – there is no need to collect, dry or weigh the plants to determine the ecological factors.

In result, we can see that in some instances, in order to identify the abiotic factors of an area it can be enough to estimate the abundance of a few well-known indicator plants.

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DENDROCLIMATIC ANALYSIS OF THE TREE GROWTH IN MESCHERA ECOSYSTEMS IN THE ERA OF GLOBAL WARMING

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Abstract: We investigated the climatic response of the tree radial growth in 1996-2009 when winters were warmer and the total precipitation was above normal because of dominance of the western atmospheric circulation form. The main factors that influenced the radial growth for oak and pine in Meschera lowland have been determined. The different responses of radial growth to climatic variability might be mainly due to the local environmental conditions. In the future, similar studies should be conducted to understand the dynamics of climate and forest biological productivity at the local and regional levels.

Key words: *Pinus sylvestris; Quercus robur;* dendroclimatic analysis; tree radial growth; era of global warming; atmospheric circulation.

Introduction. Dendrochronology was born in the early 20th century when it was discovered that tree-ring width was dependent on climatic and environmental parameters [1]. During the past decades, dendrochronology has developed into a highly diversified field of research [2]. One of the perspective directions is studying the factors controlling tree growth especially in today's climate change [3, 4, 5]. Along with an ever-increasing impact of human activities on the climate [6] one of the causes of warming in recent decades is the atmospheric circulation changing [7].

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In this paper we present the results of the study of the tree growth response to climate change in 1996-2009. According to Vangengeim-Girs classification [8], period 1996-2009 is the epoch of dominance of the western atmospheric circulation form. This period is often referred to as the era of global warming [6]. An analysis of instrumental temperature records in the center of Eastern Europe (including the Russian Plain) for this period has shown that winters have become warmer and summers - cooler. Besides, the total precipitation has become above normal [1, 6].

Methods

The study was conducted in Meschera lowland situated in the center of the Russian Plain (Ryazan Region). This area is covered by mixed coniferous and deciduous forests. The conditions for tree growth within the study sites depend on the soil moisture differences which depend on local and regional topographical conditions.

The sampling sites were from a range of locations chosen to cover micro-environmental conditions which have contrasting levels of soil moisture. In this study a total of 2 species have been studied such as Scotch pine *(Pinus sylvestris)* and pedunculate oak *(Quercus robur)*. The first sampling site of pine was situated in the conditions of the third terrace above the Oka River floodplain. This location has the maximum heights within the study sites (118-125 m). A limiting factor for the pine growth, as a rule, is lack of soil moisture. In addition to this, pine and oak cores were taken in the conditions of a flat sandy plain which corresponds to the second terrace above the Oka river floodplain (110-118 м). The limiting factors for the tree growth (lack of soil moisture or overwetting) change due to the variation of atmospheric circulation and total precipitation. Additionally oak cores were taken in conditions of waterlogged depressions where the main limiting factor, as a rule, is overwetting. The annual ring-widths were measured to the nearest 0,001 mm using a CooRecorder и CDendro measuring system. Then the age-related growth effects were removed and the ring-width chronologies

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were standardized. As a result tree-ring indices were found. The tree-ring indices were correlated with the precipitation, temperature and river discharge data from the nearby meteorological stations. To provide some insight into the relationship between tree growth and climate the regression analysis functions were calculated using the software package «STATISTICA». Because climatic conditions in the previous growing season often influence the radial growth in the following year [9], the temperature and precipitation of previous year also were used to analyze the relationships between annual radial growth and climate variables.

Results. Tree-ring indices compared with indices during the whole period of the tree growth are given in Fig. 1. A wide range of growth rates is observed between different sites of the same species. The tree-growth and climate relationship for all the sites is summarized in Table 1.

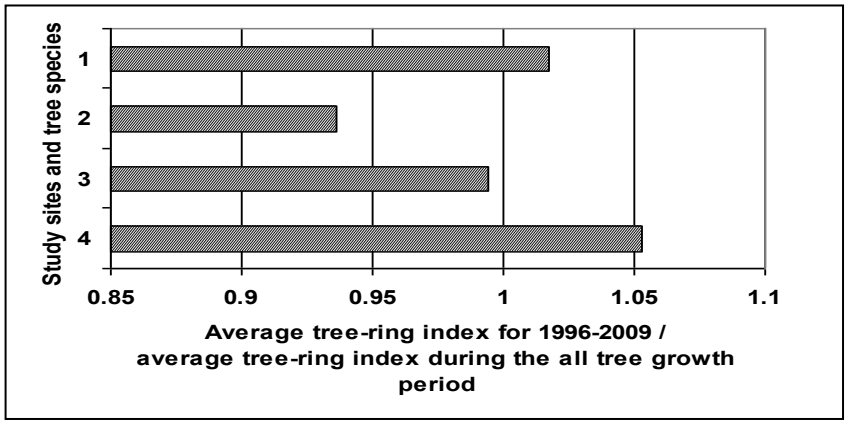

Fig. 1. The relationship between the average tree-ring index for 1996-2009 and the average tree-ring index during the whole period of the tree growth.

Note. Study sites and tree species: 1 - *Quercus robur*: the flat sandy plain; 2 - *Quercus robur*: the waterlogged depression; 3 - *Pinus sylvestris*: the 3rd terrace above the floodplain; 4 - *Pinus sylvestris*: the flat sandy plain.

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Table 1. The main factors that influenced the radial growth of oak and pine in Meschera lowland for 1996-2009 (the epoch of dominance of the western atmospheric circulation form)

Tree species	Location	Tree growth factors and values of Beta-coefficients (regression analyses results)
Quercus robur	Flat sandy plain	tMay (0,53); rNov (0,49); rMay (0,41); tDec (0,27); rApr-July$_{-1}$ (0,19); tYr$_{-1}$ (0,08); tJune (0,08); tMar (0,04).
		rCS$_{-1}$ (-0,43) tApr-July$_{-1}$ (-0,14).
	Waterlogged depression	rJan (0,37); tAug (0,32); rMay (0,12).
		rMar (-0,61); rCS$_{-1}$ (-0,44); tMar (-0,43); rSept (-0,28); t3Yr (-0,21); rCS-h (-0,09); rAug$_{t.y.}$ (-0,03); tYr (-0,02).
Pinus sylvestris	The third terrace above the floodplain	rMar (1,48); rCS-h (0,75); tAug$_{t.y.}$ (0,48); rApr (0,42); rSept (0,37); tDec (0,12); tMay (0,12).
		tAug (-1,35); rDec (-0,29); rYr (-0,20); rApr-July$_{-1}$ (-0,07); tMar (-0,01).
	Flat sandy plain	tApr-July$_{-1}$ (1,1); tYr (0,97); rAug (0,68); r3Yr (0,56); rAug$_{t.y.}$ (0,16); tMay (0,38); tJune (0,12); rJuly (0,08); rCS-h$_{-1}$ (0,04).
		rCS$_{-1}$ (-0,88); tOct (-0,23); tJan (-0,03).

Note: +b – factors which have positive effect on the tree growth; -b – factors which have negative effect on the tree growth (the value of the Beta-coefficients is indicated in parentheses); tAug, tSept, tOct, tNov, tDec, tJan, tFeb, тMar, тApr, tMay, tJune, tJuly, tAug$_{t.y.}$ – the average temperature

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respectively in August, September, October, November, December (of the previous year), January, February, March, April, May, June, July, August (in this year); rAug, rSept, rOct, rNov, rDec (of the previous year), rJan, rFeb, rMar, rApr, rMay, rJune, rJuly, $rAug_{t.y}$. (this year) – monthly total precipitation; $rApr\text{-}July_{-1}$, $tApr\text{-}July_{-1}$ – the total precipitation and temperature of April-July in the previous year; rCS_{-1}, tCS_{-1} – the total precipitation and temperature of the cold season in the previous year; rYr, rYr_{-1}, r3Yr – the total precipitation for the year, for the previous year and over 3 years; tYr, tYr_{-1}, t3Yr – the average temperature for the year, for the previous year and over 3 years; rCS – h, rCS – h_{-1} – the difference between the cold season precipitation and runoff layer of the Oka River this year, in the previous year (indicates the behavior of winter precipitation moisture).

Discussion

The sensitivity of tree growth to climate change varies with local and regional topographical conditions.

As it is shown in Fig. 1, the oak growing on the flat sandy plain has increased its radial growth in 1996-2009. That is an indicator of the favourable conditions for oak growth. The overall increased soil moisture in the epoch of the western circulation form dominance had positive effect. As it is followed from the Table 1, there are a lot of factors which have positive effect on the tree growth while there are practically no negative factors during this circulation period. Regression analyses showed there is a positive relationship of tree-ring index series with December and March temperatures and November precipitation. Increased December and March temperatures in 1996-2009 are one of the main reasons of increased soil moisture of the Meschera ecosystem. At the same time there is a strong negative response to the cold season precipitation of the previous year. Probably, a succession of with warm and wet winters in the conditions of the low-contrast Meschera area where the groundwater level is close to the ground surface can cause waterlogging.

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There is also a positive association of oak growth with May and June temperatures. As we have found earlier [10] May temperature positively correlated with oak tree-ring width during the whole period of tree growth. The reason of it is high probability of May frosts and oak sensitivity to them. May frosts can cause the death of a large part of the oak leaves. Consequently the oak tree will be forced to use all its resources to create a new assimilative organ and will reduce its radial growth.

Unlike May temperature the positive relationship of tree-ring index with June temperature has been found only for 1996-2009. That is the indicator of the likely unfavorable increased soil moisture in June. For the previous arid circulation period (eastern circulation form E 1972-1995) there was an inverse relationship of radial growth with June temperature.

As it is followed from Figure 1, the oak growing on the waterlogged depression had an inverse response to the increased total precipitation and soil moisture in 1996-2009. Negative relationship between tree growth and cold season conditions, especially increased March temperature and precipitation, have been found (Table 1). March conditions when the snow melts are crucial because they determine the behavior of winter precipitation moisture. In addition to this there was a negative response to September precipitation and as in the flat sandy plain conditions the cold season precipitation of the previous year. The negative correlation of the oak growth with August precipitation indicates that overwetting may be a limiting factor for the growth even at the end of the vegetation period.

As it is shown in Figure 1, for 1996-2009 tree-ring width of the pine growing on the third terrace above the floodplain is close to the growth index during the whole period of tree growth. Autumn, winter and spring conditions such as September and March precipitation and a warm winter had positive correlation with pine growth (Table 1). However autumn and winter moisture supply for the pine growing on the dry sandy terrace above the floodplain only lasted until mid-May. The moisture growth

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during the summer months in the epoch of western circulation hasn't been enough, so the radial growth was close to the average.

The pine from the flat sandy plain as well as the oak growing in similar conditions has significantly increased radial growth in 1996-2009 (Fig. 1). As it is followed from Table 1, limiting factor for the growth may be overwetting at the beginning of the vegetation period (because of autumn, winter and spring precipitation and temperatures) and a lack of soil moisture at the end of the vegetation period.

Thus, the different responses of radial growth to climatic variability might be mainly due to the local environmental conditions. Similarity, a response to climate change of different tree species growing in one study site has been found (for example *Pinus sylvestris* and *Quercus robur* in conditions of a flat sandy plain). Consequentl, local environmental conditions may be a more important factor of tree growth than physiological characteristics of tree species. In the future, similar studies should be conducted to understand the dynamics of climate and forest biological productivity at the local and regional levels.

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ASSESSMENT OF THE IMPACT OF HEAVY METALS ON ENZYMATIC ACTIVITY OF SOILS

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Abstract: The article reviewed as an indicator of soil contamination with heavy metals phosphatase and urease activity. The problem of soil pollution by heavy metals is relevant nowadays. Heavy metals pollute the environment and enter the soil where they accumulate in significant numbers and they almost do not lost over time.
Key words: phosphatase activity, urease activity, heavy metals.

Heavy metals are one of the most dangerous pollutants of the environment for which, in principle, there are no mechanisms of self-purification. They just move from one natural reservoir to another, interacting with the different categories of living organisms and leaving the negative consequences of this interaction everywhere. These elements are more dangerous for person who is on the top of the food chain. People can obtain products with concentrations of toxicants in 100-10,000 times higher than in the soil [1]. This particularly affected the cardiovascular and nervous system, kidneys, gastrointestinal tract, hematopoietic system and bony tissue [1].

A significant proportion of the heavy metals polluting the natural environment get into soil, which is a powerful accumulator and do not decompose over time. Therefore, the problem of soil pollution by heavy metals becomes more urgent every year.

Accumulate in the soil in large quantities, heavy metals can change the properties of soil [2], and it may also affect the

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microbiological and biochemical indices [1]. The nature of the interaction between heavy metals and soil microorganisms is ambiguous: depending on the concentration the heavy metals may act either as bioactivators or as toxic to living organisms elements. Small quantities of elements such as Zn, Si, Mo, To stimulate the growth and development of microorganisms, involve in their metabolism [3]. About 20 microelements are part of enzymes, vitamins, hormones. High concentrations of heavy metals disrupt the vital functions of soil microorganisms and, consequently, their ongoing biochemical processes. So, it has described a large number of researches to reduce fermentative, nitrogen-fixing, nitrifying and cellulose-digesting activity of soils [1].

Despite the fact that to date it has conducted a significant number of experiments indicating contamination of soils with heavy metals by determining the activity of soil enzymes, the question of identifying universal and representative enzymatic indicators of soil contamination with heavy metals still remains unanswered. In this regard, it is useful to study as an indicator of soil contamination with heavy metals phosphatase and urease activity.

Work to determine the enzymatic activity of soils was performed at the laboratory of Geochemistry and soil Mineralogy Institute of physicochemical and biological problems in soil science RAS. The study examined selected soil monitoring sites plot "Yamskaya steppe" nature reserve "Belogorye", at the Northern boundary of which is the tailing of one of the largest Russian iron ore manufacturers – Lebedinsky mining and processing plant.

To determine phosphatase activity used the method of A. S. Galstyan and E. H. Harutyunyan, based on the quantitative accounting of inorganic phosphorus or the alcohol portion of hydrolyzed substrate. The phosphatase activity was expressed as mg P2O5 per 100 g of soil for 1 hour [4]. Urease activity of soil

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was determined by taking into account the amount of ammonia formed during the hydrolysis of urea [5, 6].

The obtained results allow identifying the following patterns. First, the phosphatase activity of the soil decreases by increasing the concentration of heavy metals. Secondly, the nature of the effect of heavy metals on enzymatic activity of soil depends on the kind of metal. So, for example, zinc and lithium did not lower phosphatase activity of the soil because they include in the composition of biologically active substances. Thirdly, there is no significant effect of heavy metals on urease activity: mixed inaccurate results for different heavy metals, and for one heavy metal, but in different soil horizons. However, keep in mind that it is the exception rather than the rule because the high sensitivity of this indicator to the pollution of soils with heavy metals confirm by the most of the researches [1].

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THE DYNAMICS OF THE TUAPHAT ARRAY COASTAL ZONE AND EVALUATION OF ITS STABILITY

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Abstract: Seashores are of great scientific and recreational value. Human activities make a severe impact on coastal systems. In addition to the human impact on the coastal zone there are many different natural processes that shape the sea shore. In this context, it is interesting to follow the dynamics, stability and attractiveness of the beaches in one of the Black Sea coastal areas of Russia.

Key words: seacoasts, dynamics of the coastal zone, the array Tuaphat, stability of the coast, shore attractiveness.

The research took place in Gelendzhik district of Krasnodar Territory. We studied the Black Sea coast between Blue Bay and the village of Kabardinka, at the bottom of the coastal slopes of the southerly aspect of the array Tuaphat. The array is composed mostly of sandstone, limestone, marl and mudstone Cretaceous sediments. There are quaternary marine terraces along the coast. The coastal zone is a typical erosion shoulder to 100 meters in height, falling only in the mouths of creeks. For the detailed study of this coastal area 75 investigation points from Blue Bay to the village of Kabardinka were chosen.

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Figure 1 The space image of the area: the village of Kabardinka-Blue Bay

The aim of the work is the study of the Tuaphat array coastal zone dynamics, assessment of its sustainability and attractiveness.

The main research methods: literature analysis; field landscape profiling; interpretation of space images; geotagging and photography; data processing in the programs AutoCAD 2016 and ArcGIS.

When studying this section of the coastal zone, some certain regularity is observed: the number of beaches and their width increase as we move away from Blue Bay to the village of Kabardinka. The number of landslides increases as well. It should be noted that the height of the shore step decreases. On all the beaches except boulder-pebble ones there is a tendency for the size of pebbles to increase with the distance from the sea. The organic waste is present on almost every beach, but in different amounts. Inorganic waste is concentrated mainly at points 9, 15, 24, 26, 74, and two inorganic waste dumps are located at point 55.

The largest landslides are situated closer to Blue Bay. As you approach the village of Kabardinka the number of landslides

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increases, but their size decreases. The widest beach is at point 55, its width is 25 meters. The beach located at point 59 is wide too, its width is 21 meters. The narrowest beach is at point 46, it is 3.94 meters wide. Besides, narrow beaches are located at the base of Blue Bay, at points 1 and 3, they are 4.65 meters in width. The beaches at points 3, 26, 74 have the greatest number of terraces: 4 terraces are noticed in each of these areas. At points 1, 32, 36, 41, 47, 53, 54 and 64 terraces are not available. It should be noted that the number of shallow beaches without terraces significantly increases as one moves away from Blue Bay to the village of Kabardinka. Due to the active dynamics of the coastline, the structure of the beaches constantly varies.

It should be noted that the studied area is characterized by the frequent occurrence of fires. Within the period of the study, four areas affected by fires were noticed. Activity of fires on the beaches themselves is not visible, but fires have an impact on the stability and attractiveness of the coast.

The stability of the coast [1, p. 97] was evaluated according to a number of criteria on a 5-point scale. Then the division of natural complexes of the coast into 4 categories was made: 1 – stable beaches, 2 – relatively stable beaches, 3 – slightly stable beaches, 4 – unstable beaches.

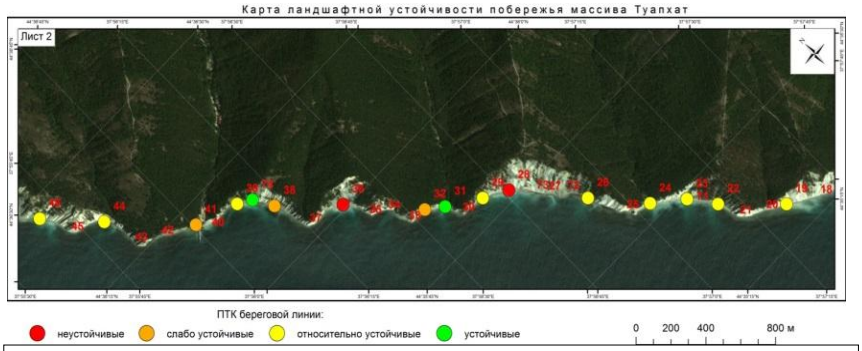

Figure The map of landscape stability: coast section from point 46 to point 18.

According to the data the map of landscape stability of the Tuaphat

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array was made. On analyzing the map one can conclude that the studied area is dominated by slightly stable and relatively stable beaches (Figure 2). There are 5 stable beaches; they are distributed evenly along the shore. After analyzing the location of the stable beaches, one can notice that such sites are located mainly in the crevices and places of decreasing height of the slope array Tuaphat. The total amount of unstable beaches is 7, they mainly focus at points 47-51, which are located near the village of Kabardinka. They are located mainly in the areas of increasing height of the slope array Tuaphat.

In this study attractiveness refers to the attractiveness in terms of recreation [2].

A number of criteria for evaluating each point were found out and eventually all the beaches were divided into 4 categories: 1 – attractive beaches; 2 – relatively attractive beaches; 3 – slightly attractive beaches, 4 – unattractive beaches.

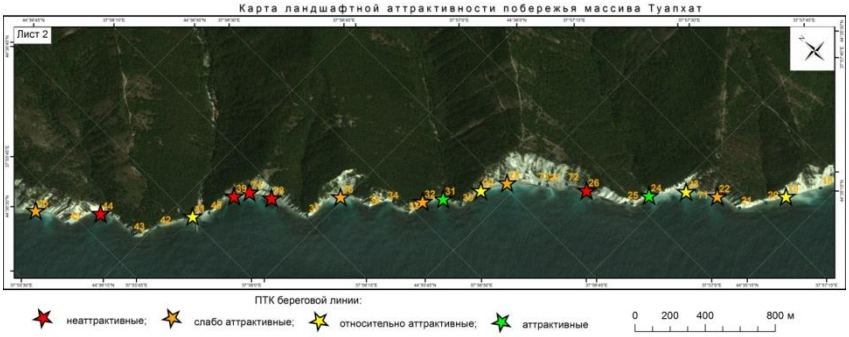

Figure 3 The map of landscape attractiveness: coast section from point 46 to point 18.

According to the data the map of landscape attractiveness of the Tuaphat array coast was also made. After analyzing the map one can conclude that the number of unattractive beaches is 11, and in general they are concentrated at points 38-39 and 48-51 (Figure 3). Basically they are either heavily contaminated shore areas or boulder-pebble ones. The number of attractive beaches is only 4. They are evenly distributed along the shore. Such coastal areas are mainly located either at the low slope of the Tuaphat array, or in cracks. There are an equal number of slightly attractive and relatively attractive beaches; these beaches are also almost evenly distributed along the shore.

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The conclusions are the following.

The dynamics of the coastal zone is influenced by endogenous, exogenous and anthropogenic processes.

The coastal zone of the Tuaphat array is characterized by a large number of landslides and abrasion ledges.

The result of this work is the Tuaphat array geodynamic map, which shows all the peculiarities of the studied area.

While assessing the stability and attractiveness of the Tuaphat array the beaches were divided into 4 categories.

The result of the work is the map of landscape stability and attractiveness of the Tuaphat array coast.

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ENERGY-SAVING, ENVIRONMENTALLY FRIENDLY CHEMICAL AND TECHNOLOGICAL PROCESSES

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ASSESSMENT OF ECOLOGICAL AND HYGIENIC PROPERTIES OF WOOD ENERGY

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Abstract: Using wood waste as source energy, representing a new way to solve pollutions problems by the traditional fuels.

Key words: wood waste, energy, fuel, gasification, hydrolysis.

The accumulation of waste, especially in big cities, is increasing day by day rapidly. This natural cycle of metabolism won't be able to cope with the ever-increasing volume of waste that has created the basis for a serious ecological crisis.

Today the developed of technology is increasingly as the production of heat and electricity using a fuel refined wood pulp, making a mark in the thermal efficiency, economic and environmental characteristics of this fuel components with natural gas and replacing fossil fuels - coal, and petroleum products. In the other hand, wood pulp is renewable, and of course environmentally friendly fuel. That's the reason to study energy technologies from wood waste by gasification and hydrolysis and their ecological and hygienic properties. Is necessary to identify the problems and advantages of using wood as a source of energy, getting the indicators of moisture, ash, sulfur, carbon, nitrogen and trace impurities in wood energy

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resources, evaluating the impact of wood energy on the environment.

Gasification technology is taking step by step the direction of wood waste from one site production to another, to produce the final product. [1]

There is a harvesting area into the transported to the lower landing, where it is sorted, then the wood is transferred to the enterprise for the production of sawn timber, and the waste received at the site of preparation of biomass, which is crushed into chips, sorted and stored. Part of the sorted pulp is fed to the refining section; the remainder is transferred to the local power units and used as fuel.

Production of wood energy is optimal, and has the following qualities: renewability, concentration of energy, transportability, recyclable waste incineration and storage.[2]

The best result in the use of waste makes a country with a highly developed sawmill and wood-processing industry, means the main supplier of waste, such as the US, Canada, Japan and the countries of Northern and Central Europe.

In the limited forest resources among the Sweden waste is dominated by wood chips - about 60%, which constitute the raw material basis for the production of fiberboard and particleboard. In Finland, more than 85% of the waste is consumed in the pulp and paper industry. In the United States in early 2013 produce about 1.1 million tons of pellets per year.[3]

The introduction of the enterprises of a timber industry complex of facilities for the production of fuel energy from waste using gasification technology will solve the problem of using non-market wood and wood waste, reduce the amount of wood waste accumulating in dumps timber processing by companies that cause environmental harm nearby water bodies, to ensure the wood-processing enterprises, forest villages, and urban population cheap items of electrical and thermal energy, in general, improve the ecological environment.

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BACTERIAL AND CHEMICAL LEACHING OF METALS – THE KEY TO THE AVAILABLE MINERAL RESOURCES

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Abstract: The conditions of life of chemolithotrophic microorganisms associations, isolated from samples of oxidized ore of coal deposits "Cheremhovsky" (Irkutsk region, Cheremhovo) are identified. The iron-oxidizing ability, isolated associations to the process of biological oxidation of ferrous iron is studied.

Key words: chemolithotrophic microorganisms associations, oxidized ore, coal deposits "Cheremhovsky", biological oxidation.

Currently, one of the urgent problems of our time is the depletion of natural mineral resources. One of the approaches to solving this problem is the use bioleaching based on application of different types of microorganisms, which when exposed to

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gradually create conditions for better interaction of chemicals with the mineral surface and transfer of heavy metals from insoluble in soluble state [1; 2, p. 26]. Thanks to the technology of bacterial leaching it is possible extraction from ores, mining waste and metallurgical production of valuable components (different metals) [3, p. 10; 4, p.31].

Today there are about 30 bacterial cultures to be able to participate in the bioleaching of mineral products [5, p.32]. The most studied microorganisms and actively applied in practice bacterial leaching of metals are representatives of the genus *Acidithiobacillus*, capable of oxidizing heavy metals from sulphide ores [6, p. 13].

When investigating ore deposits by different investigators have shown that the number of bacteria cells in the oxidation zone reaches 1 million to 1 billion per 1g ore [7, p. 67; 8, p. 162].

The aim of this study was isolation of autochthonous acidophilic chemolithotrophic microorganisms associations for further possible application of these associations in the technology of bacterial leaching technology of sulfide ores from waste.

Sources for the isolation of microorganisms were coal dumps in the area is actively developing coal deposits "Cheremhovsky" (Irkutsk region, Cheremhovo).

In the process of accumulation of microbial cultures, within a month of cultivation of the investigated samples of coal ore mine "Cheremhovsky " highlighted various representatives of microbial associations (picture1.)

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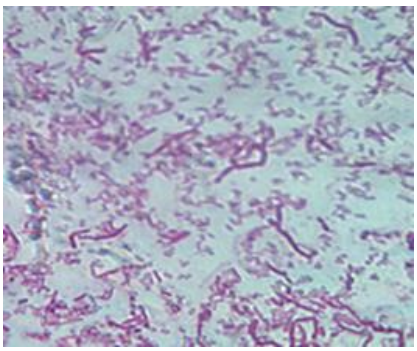
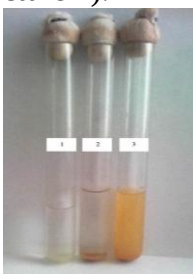


Picture1. Enrichment culture acidophilus chemolithotrophic microorganisms isolated from coal ore mine "Cheremhovsky"

The study microbial associations is presented species *A. ferroxidans* (motile, gram-negative, single and in chains asporogenous rods, aerobic, moderate thermophiles (upper temperature limit of 40^0C), pH tolerance range of 2.0 to 4.0) and *A. thiooxidans* (mobile, gram-negative, small nonsporogenous sticks, aerobic, mesophiles (optimum temperature of 30 - 37^0C) , the optimum development pH 2,0-4,0.

During the growth of the bacteria there is a gradual change of color of the nutrient medium: liquid nutrient media without the addition of microbial associations is transparent, the medium inoculated with bacteria acquires amber color due to the formation of ferric ion (picture 2).



Picture 2. Change the color of the culture medium Silverman-Lundgrena (9K): 1 – non-inoculated with bacteria the culture medium; 2,3 – the growth of chemolithotrophic microbial associations.

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Studying the dynamics of substrate oxidation revealed that increasing the concentration of iron in solution starting from the 4 th to 15 th day of cultivation, and increases from an initial concentration of 1 g/l at 15 day in medium Silverman 7 times, and in medium Waksman 5 times от day 8 day of cultivation.

The results of these studies have shown that the highest oxidized ability found in medium Silverman-Lundgrena, but the allocation of iron affects more time than medium Waksman.

Therefore, we assume that data obtained to determine the living condition of the chemolithotrophic microbial associations and intensity of the oxidation of iron can be used to design systems to extract iron from sulfide ores and waste ore concentrates.

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ENVIRONMENTAL IMPACTS OF SHALE GAS DEVELOPMENT.
EXPERIENCES OF THE UNITED STATES

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Abstract: The environmental impact of shale gas in the United States is considered. The tremendous harm to environment of hydraulic fracturing is analyzed.
Key words: shale formations, the United States, hydraulic fracturing, fracking, horizontal drilling, proppants.

Shale gas is a natural gas which is found locked within shale formations. Initially shale gas has become an increasingly important source of natural gas in the United States. Thus, interest has spread to potential gas shales in the rest of the world. The production of shale gas in commercial quantities requires hydraulic fracturing also known as "stimulation" or "fracking". Resources of natural gas that require greater than industry-standard levels of technology or investment to harvest are known as «unconventional gas» resources, for example, a shale gas. After a huge success that the United States companies managed

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to achieve in the field, unconventional gas has become a subject of primary interest for both energy importing and exporting companies. Though these resources of natural gas were historically overlooked in search of more economical, conventional reserves, their growing use has led to increased investment in unconventional gas exploration.

Nowadays, many countries are making efforts to develop unconventional resources of natural gas, including shale gas. This fact holds true due to the falling domestic production of gas from traditional fields in the gas producing countries, increasing dependence on gas imports and growth in the demand for gas. [1]

Shale gas is a natural gas produced from shale formations that typically function as both the reservoir for the natural gas. In terms of its chemical makeup, shale gas is a dry gas primarily composed of methane (90% or more methane), but some formations do produce wet gas. For example, The Antrim and New Albany formations have typically produced water and gas. Depending on the deposit characteristics the gas contains various additional shares, such as CO2, hydrogen sulphide and radioactive radon.

Gas shales are organic-rich shale formations that were previously regarded only as source rocks and seals for gas accumulating in the stratigraphically-associated sandstone and carbonate reservoirs of traditional onshore gas development. Shale is a sedimentary rock that is predominantly comprised of consolidated clay-sized particles. Shales are deposited as mud in low-energy depositional environments such as tidal flats and deep water basins where the fine-grained clay particles fall out of suspension in these quiet waters. During the deposition of these very fine-grained sediments, there can also be deposition of organic matter in the form of algae-, plant-, and animal-derived organic debris. The naturally tabular clay grains tend to lie flat as the sediments accumulate and subsequently become compacted as a result of additional sediment deposition. This results in mud

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with thin laminar bedding that lithifies (solidifies) into thinly layered shale rock. The very fine sheet-like clay mineral grains and laminated layers of sediment result in a rock that has limited horizontal permeability and extremely limited vertical permeability. Typical unfractured shales have matrix permeabilitieson the order of 0.01 to 0.00001 millidarcies. This low permeability means that gas trapped in shale cannot move easily within the rock except over geologic expanses of time (millions of years). [2]

All deposits of unconventional natural gas resources have a common characteristic. The gas quantity per rock volume is small compared to normal fields, and they are dispersed over a large area consequently the permeability is very few. Special techniques are requisite to extract such gas. Also due to the small hydrocarbon content in the source rocks, the amount extracted per well is much smaller than of normal fields, making their economic production much less effective. These methods need modern technologies, lots of water, proppants and chemicals, which negative environmental impact.

Usually, shales have low penetrability. Therefore most shales are not effective as commercial natural gas resources. To increase gas production to a commercial scale it would require vast artificial cracks around wells to provide permeability. For this reason the contact between the well bores and the pores is necessary artificially improved. For this purpose used hydraulic fracturing or «fracking». [3, p. 17]

Hydraulic fracturing works in the following way. The derrick bores vertically into the gas-bearing layer. Considering the thickness of layer merely vertical wells are bored or they are transformed into horizontal wells. Horizontal drilling is frequently employed with shale gas wells, with lateral lengths up to 10,000 feet (3,000 m) within the shale, to create a maximum drill-hole surface area in contact with the shale. [2] Within the layer source rocks explosive materials are used to create small cracks by perforating the casing. These cracks are

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then artificially expanded through being filled with water under heavy pressure.

The quantity of artificial cracks, their size and their locating within the layer (horizontal or vertical) depend on the formation itself. Each formation has its own details. These details have an impact on numerous things, such as consumption of the water, the size of the artificial fractures and interval between the wells (vertical wells are more tightly drilled than horizontal wells). The water is under pressure opens up the fractures and infiltrates to as many pores as possible. When the pressure is lessened, the gas and waste water mixed with heavy or radioactive metals from the rock formation come up to the surface. Proppants are sand grains which are miscible with water. They act as spline to keep the fractures open and to facilitate extraction of gas. In addition, chemicals are used with this mix in order to obtain a homogeneous distribution of the proppant by forming a gel. This reduces friction. The gel structure breaks at the end of the hydraulic fracturing to allow for the backflow of the fluid. [3]

Advanced technology used in fracturing process causes tremendous harm to the environment. [4] The probable impacts on the environment due to the usage of these technologies are described below, as an example we take the experiences in United States.

1. Impacts on landscape. The development shale gas needs well pads for the storage of the trucks with compressors, of technical facilities, chemical substances, proppant, water and containers for waste water. For example, well pads in Pennsylvania have a characteristic size about 4-5 acres (16,200-20,250 m²). In addition after partial restoration well pads this size might reduce just to 1 – 3 acres (4,050-12,150 m²).

2. Air pollution, soil pollution and noise. [3] Potential sources of the pollutant emissions are:

a) drilling equipment, trucks and processing of natural gas (CO, CO_2, SO_2, NOx, particulates, noise);

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b) ponds of waste water with chemicals which are evaporating;
c) spills of fracturing fluids or dispersions of drilling;
d) the process production, processing and transport shale gas during which might happen non-organized emissions of methane.
3. Impacts on surface and ground water [4], [3]:
a) During the boring of the well to use a lot of water to remove the drilling mud and to cool the drilling head. In hydraulic fracturing is consumed ten times more of water for the stimulation of the well. For example, according to earlier studies of the Texas Water Development Board about the specific water consumption of the Barnett shale reach 4 MGal (~15 million liters) of water for elder uncemented horizontal wells with a single fracturing stage. For new cemented horizontal wells needed about 2000-2400 gal/ft (25-30 m^3/m) of the water.
b) Probable contamination of the water might happen during the process of drilling of itself by reason of spills of drilling mud, flowback and brine. For this reason originate contamination of the water and saline. Next reasons contaminations of the water are accidents which happen on the surface of well pads because of old technical facilities or unprofessional handling. For example, leaks of ponds, waste water or hydraulic fracturing mix. Even more leaks may happen from insufficient cementing of the bores from which the contaminants permeate in the geological structures. And further through natural or artificial fractures the contaminants penetrate in water.
c) It is noteworthy, according to earlier studies it has been established that with the increase quantity of gas bores located in the Mamm Creek Field in the Piceance Basin, Colorado rises quantity methane in ground waters and has been identified that these methane are thermogenic origin. Also in these gas bores observed the increase of chloride.
4. Scholars have been established that hydraulic fracturing is a triggering factor for little earthquakes in the order of 1 – 3 at the Richter. For example, by virtue of growth in drilling works in the

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Fayetteville Shale, in Arkansas, USA, the velocity of earthquakes has risen in recent years.

5. The release of radioactive materials to the surface. By reason of hydraulic fracturing naturally radioactive particles uranium, radium and thorium which are in the any geological formation, constantly migrate with the fluid are reaching of the surface and are returning. In addition, radioactive materials enter into the composition of the fluids as proppant tracer.

6. The used chemicals. [3, p. 31], [1, p. 12-13] The characteristic proportion of a mixture of the hydraulic fracturing include about 98% water and sand, and only 2% chemical agents. But these chemicals almost always very toxic, they comprise mutagens, allergens and carcinogens. In accordance with created list provided by the New York State 2% chemical additives include about 260 toxic substances. Among which are Benzene, Ethyl Benzene, Naphthalene, and Acrylamide. They are published on the first list of 33 priority substances of Annex II to the Directive on Priority Substances (Directive 2008/105/EC). 17 other substances are toxic for aquatic organisms (acute and/or chronic). 5 other have reproductive effects. Another 7 are mutagenic, for example, ethylene oxide and again benzene. It is noteworthy that all of them exert negative influence on the environment.

7. Effects on human health [1, p. 12-14], [3]. Organic compounds are known to cause headaches and other sicknesses, such as asthma, neuropathy and oncological diseases. Poisoned drinking water is undrinkable and can have coloration from none to black. Pollution of ground waters may also be hazardous by reason of people use water with contaminants. For example, owing to frequent contacts children with contaminated water they more subject risk of various diseases than the grown-ups. For instance, for them often allergy and intestinal intoxication are typical. In addition, wastewater, ponds with vaporizing fluid negative affect on local

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inhabitants. For example, owing to this they have skin itching, chronic headache.

8. In the field of shale gas production it is observed that sea animals, birds, fish, streams are boiling with methane. Pets get sick, lose their hair, they die.

USA is a country with several decades' worth of practice, concerning the impact of hydraulic fracturing. The technology gas shales development shows inevitable impacts on the environmental. There is a high risk if the technology of extraction and production is not in use right. Even then, there are still risks of environmental and human health damage. Inevitable impacts are from enormous land intake and large landscape changes. It is an open question, whether injecting harmful chemicals into the soil should be allowed. The long-term effects are not yet thoroughly researched. In conclusion, some risk is possible during unregulated fracturing. It can induce unruled impulse of fluid of hydraulic fracturing or of the natural gas. In conclusion, experiences of the United States concerning the impact of hydraulic fracturing demonstrate that there is a significant problem of negative environmental impacts of shale gas development. Unfortunately, this is a problem that can arise worldwide.

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García P. R.

EVALUATION OF THE CHARACTERISTICS OF PINEAPPLE'S JUICE AXIS'(ANANAS COMOSUS) INFLORESCENCE, AS AN ALTERNATIVE TO THE SUCROSE SYRUP, USED IN CANNED PINEAPPLE SLICE

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Abstract: This research study consisted in evaluating the characteristics of the pineapple's (Ananas comosus), juice axis' inflorescence to be used as an alternative to sucrose syrup, used in canning of pineapple slice. One of the main objectives of the research is the use of solid residues resulting from the process. The average yield of inflorescence axes were determined to establish an approximate volume of juice to be drawn regarding the amount of mass provided. The concentration of sucrose presented in the juice was low compared the syrup used in the canning, evaporation was performed by indirect heating to carry an approximate concentration at which one would be added in the syrup, for comparing their physicochemical characteristics (total soluble solids concentration, hydrogen potential (pH) and density). PH stability regarding to variation of concentration to verify

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that this will not exceed the limits required in the formulation of syrups and that there was no microbial growth was analyzed. Based on the investigation, it is established that the juice can be used as an alternative to sucrose syrup used in the canning of pineapple slice.

Key words: Syrup, Caramelization, Brix degrees, inflorescence axis, total soluble solids, hydrogen potential.

Introducción. La piña es una de las frutas tropicales más importantes en la producción mundial. Su comercio internacional consiste principalmente en productos procesados como la elaboración de conservas, jaleas, jarabes, confituras, helados, jugos, enlatados, jugos enlatados y bebidas alcohólicas. Además la piña puede ser aprovechada como fruta fresca. Los residuos de la piña procesada sirven para alimentar ganado y para la extracción de ácido cítrico y elaboración de vinagre.

Generalmente, en Guatemala se utiliza únicamente un porcentaje mínimo del total de la piña desperdiciando recursos, los cuales pueden ser utilizados para generar mayores ganancias, una mayor optimización de recursos y una disminución de residuos sólidos y evitar la degradación del medio ambiente. En la actualidad, se ha generado un aumento poblacional y un crecimiento en la demanda de producción de alimentos. El objetivo es aprovechar los recursos no utilizados para la sustitución de la sacarosa en el almíbar que ayuda a conservar los alimentos.

Sin embargo, no es suficiente elaborar alimentos 100 % sanos y que simplemente satisfagan al consumidor. Se busca elevar la calidad de vida de las personas produciendo alimentos funcionales.

Se evaluaron las características del jugo del eje de inflorescencia, para realizar una comparación con el almíbar utilizado. El jugo del eje mantiene sus propiedades estables durante el proceso de concentración del jugo.

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Materiales y metodología

La evaluación de las características del jugo del eje de inflorescencia de la piña con respecto al almíbar utilizado actualmente en la producción de enlatado de la rodaja de piña, se llevó a cabo en el laboratorio de ciencias químicas en el edificio UTRECHT de la Escuela de Formación de Profesores de Educación Media -EFPEM-, de la Universidad de San Carlos de Guatemala.

Se recolectaron los ejes de inflorescencia desechados del área de producción de Alimentos Montesol, S. A. Se extrajo el jugo del eje de la inflorescencia de la piña por medio de un extractor de jugos centrífugo, para cuantificar las propiedades fisicoquímicas del extracto y así evaluar las características del jugo del eje de inflorescencia con respecto al almíbar utilizado en el enlatado de la rodaja de piña. La materia prima utilizada fue el eje de inflorescencia de la piña y los reactivos utilizados para la comparación de almíbares fueron sacarosa, ácido ascórbico y agua.

Para algunas de las propiedades fisicoquímicas medidas se utilizaron equipo de medición digital. El potenciómetro se utilizó para la medición del pH, el refractómetro, para medir la concentración de sólidos solubles totales, el termómetro, para la medición de temperatura y la balanza analítica para la medición de masa. Se utilizó distinto tipo de cristalería para la medición de volúmenes y para la realización de la concentración del jugo por medio de un calentamiento indirecto (Baño María). Para la determinación de los valores promedio se utilizaron las ecuaciones del valor promedio, desviación estándar y coeficiente de variación.

Resultados y discusión

Para la determinación del rendimiento del volumen del jugo con respecto a la masa del eje de inflorescencia se realizaron dieciséis muestreos de recolección de desechos sólidos en Alimentos Montesol S. A., en los cuales se midió la masa de los ejes, teniendo en promedio un aproximado de 166 ejes por cada

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kilogramo. Valor que puede variar dependiendo de la temporada y al tamaño del producto que se obtenga; de igual manera se determinó una longitud promedio del eje de 13,0 cm aproximadamente. El rendimiento del jugo del eje de inflorescencia de la piña (*Ananás comosus),* se determinó a partir de la masa de los centros, el cual equivale a 13,08 kg. En promedio se obtuvieron 4 231,25 mL (4,23 L) de jugo. El rendimiento volumen/masa es de 345,50 mL/kg. Debido a la extracción del jugo se aprovecharon los residuos sólidos generados. Determinándose una reducción del 99,16 % de su masa inicial. El 0,84 % restante puede ser utilizado para la alimentación de ganado.

Tabla I. **Rendimiento promedio del jugo del eje de inflorescencia de la piña (ananás comosus) y porcentaje de reducción de residuos sólidos después de la extracción**

Residuo	Residuo (kg)	Jugo (mL)	Rendimiento (mL/kg)	Desecho Final (g)	Porcentaje de reducción de residuos sólidos
Eje de inflorescencia	13,08	4 231,25	345,50	109,56	99,16%

Fuente: elaboración propia.

En el jugo obtenido se determinó un pH de 4,61 y sólidos solubles totales promedio (°Bx) de 11,23 °Bx , que indican el nivel de acidez y la concentración de azúcares respectivamente.

Tabla II. **Propiedades fisicoquímicas del jugo del eje de inflorescencia después de ser extraído**

Residuo	pH	Sólidos Solubles totales (°Bx)	Densidad (g/mL)
Eje de inflorescencia	4,61	11,23	2,89

Fuente: elaboración propia.

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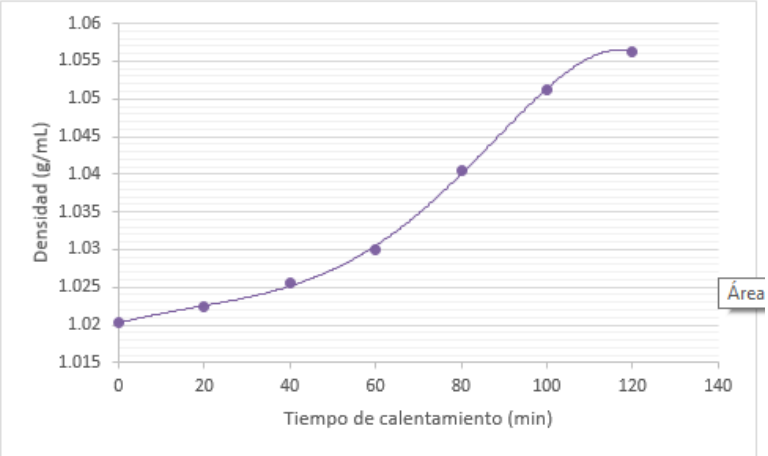

Fuente: elaboración propia, Microsoft Excel 2013.

Figura 1. Comportamiento de la densidad del jugo del eje de inflorescencia en función al tiempo de calentamiento

Tabla III. **Descripción de la figura 1**

Color	Modelo matemático	R^2	Intervalo de validez
	$\rho = -6 \times 10^{-12}t^5 + 1 \times 10^{-9}t^4 - 5 \times 10^{-10}t^3 - 2 \times 10^{-06}t^2 + 0{,}0001t + 1{,}0203$	0,9995	[0 - 120]min

Fuente: figura 1, elaboración propia.

Se observó el comportamiento de la densidad conforme el tiempo de calentamiento y la variación de la concentración (figura 1). Teniendo un modelo matemático polinomial de grado 5 con respecto al tiempo. La densidad es una propiedad que varía con respecto a la variación de la temperatura. Por tanto dicho modelo matemático es de utilidad para mantener el almíbar formulado con las características establecidas con el almíbar actualmente utilizado en la producción del enlatado de la rodaja de piña.

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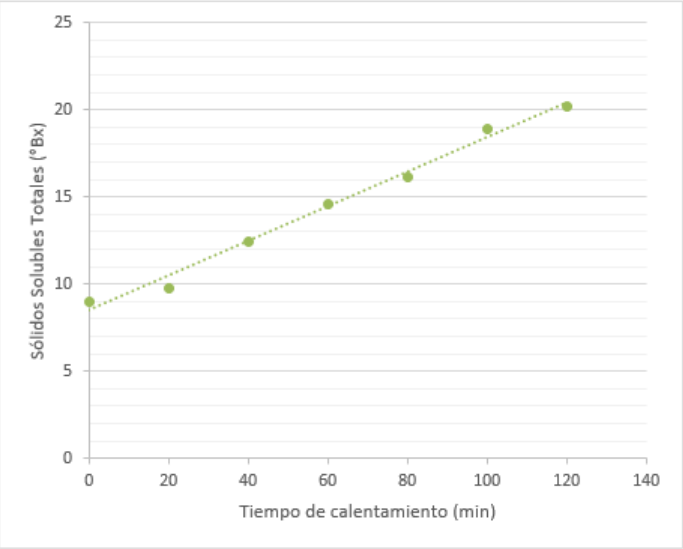

Fuente: elaboración propia, con Microsoft Excel 2013.

Figura 2. Variación de la concentración de los sólidos solubles totales presentes en el jugo del eje de inflorescencia, en función del tiempo de calentamiento

Tabla IV. **Descripción de la figura 2**

Color	Modelo matemático	R^2	Intervalo de validez
	°Bx = 0,0991(t) + 8.4786	0,9907	[0 - 120]min

Fuente: figura 2, elaboración propia.

Se analizó el comportamiento de la variación de la concentración de los sólidos solubles totales presentes en el jugo del eje de inflorescencia, con respecto al incremento de temperatura (figura 2). Se observó un comportamiento directamente proporcional, es decir que la concentración aumentará conforme aumenta la temperatura y el tiempo de calentamiento. Se determinó un modelo matemático lineal, $°\mathrm{Bx} = 0{,}0991\ (\mathrm{t}) + 8{,}4786$ con el cual se podrá utilizar para establecer el tiempo que requiere el jugo para llegar a una

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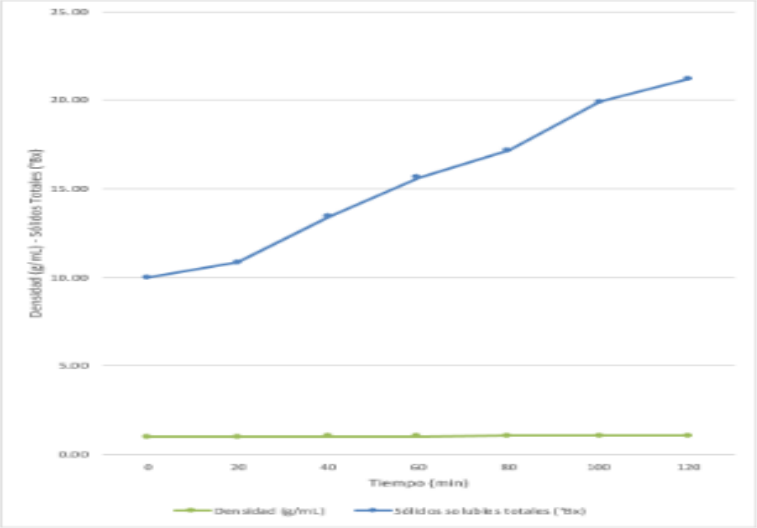
concentración deseada. La cantidad de jugo utilizada fue de 100 mL. Por lo que el tiempo será proporcional a la cantidad de jugo a concentrar. Es necesario realizar la evaporación indirecta, ya que si se realiza de forma directa disminuye el tiempo de concentración, pero a la vez afecta la textura y el aroma del almíbar además este se carameliza. La gráfica obtenida tiene una correlación de 0,9907 lo cual establece confiabilidad con un intervalo de validez de 0 a 120 min del tiempo de calentamiento. La temperatura del agua utilizada en la evaporación indirecta se mantuvo en el punto de ebullición previo a la formación de burbujas (90 °C). Durante el calentamiento se fue midiendo el pH con respecto al tiempo, con el propósito de observar y evaluar la estabilidad mientras existía una variación de concentración de los sólidos solubles totales y una variación de temperatura.



Fuente: elaboración propia, con Microsoft Excel 2013.

Figura 3. Comparación entre el comportamiento de la concentración de sacarosa y la densidad, conforme aumenta la concentración

Se comparó el comportamiento de la concentración del jugo con respecto al comportamiento de la densidad durante el

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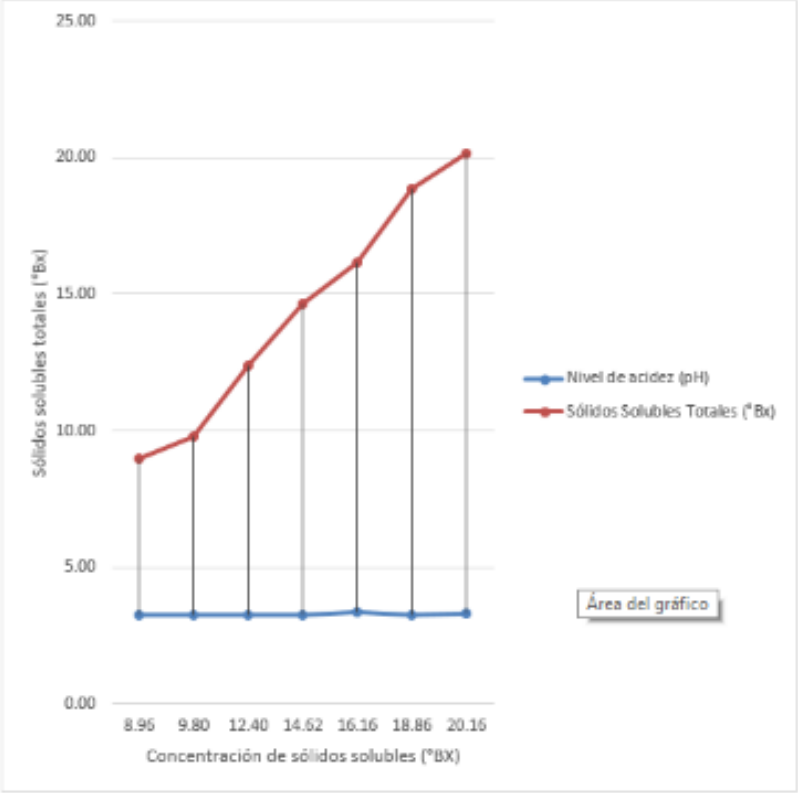
tiempo de calentamiento. La densidad mostro un comportamiento estable (figura 3).



Fuente: elaboración propia, con Microsoft Excel 2013.

Figura 4. Estabilidad del nivel de acidez en el jugo del eje de inflorescencia con respecto a la variación de concentración de sólidos solubles totales (ºBrx)

De la misma manera que se comparó el comportamiento de la variación de la concentración con respecto a la densidad, se comparó con respecto al nivel de acidez (figura 4). Se observó que el pH se mantiene de forma estable, mientras se va variando la concentración y la temperatura de la solución, durante un

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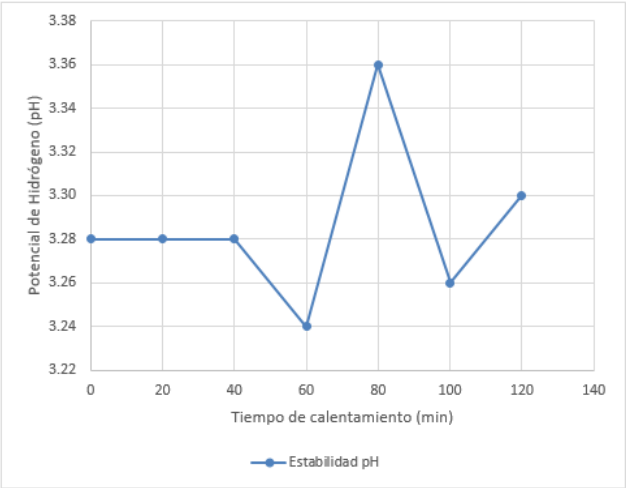
tiempo de 120 min. Al observar que no existe variación con respecto a los dos parámetros mencionados, se establece que el jugo no sufrirá cambios en el nivel de acidez al ser envasado y al ser esterilizado. Ya que estos son tratados a temperaturas de 80 °C y 120 °C o más, respectivamente.

El ácido ascórbico alimenticio (vitamina C) es el preservante y antioxidante utilizado en el almíbar con el que conservan la piña. Cada lata contiene con aproximadamente 140,0 mg por cada 100 g de producto; en cambio el jugo del eje de inflorescencia contiene 47,80 mg por cada 100 g de vitamina C, siendo aproximadamente un 34,14 % de lo que se utiliza actualmente; no obstante, el nivel de acidez del jugo es mayor, es decir es más ácido. Por lo que el crecimiento de microorganismos en el jugo sería menos probable, debido a que la probabilidad de crecimiento de los mismos a un pH inferior a 3,4 es menor.



Fuente: elaboración propia, con Microsoft Excel 2013.

Figura 5. Estabilidad del potencial de hidrógeno (pH) en función del tiempo de calentamiento y la variación de la concentración

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En el comportamiento del pH con respecto a la temperatura (figura 5), se observó que se mantiene en un mínimo de 3,20 y un máximo de 3,36. Y esto se debe a que la concentración de vitamina C no se ve afectada por el incremento de temperatura. Y esto se debe a que la cantidad de vitamina C se mantiene diluida en el jugo, ya que no sobrepasa el límite de solubilidad en agua de 33,0 g por cada 100 mL. Debido a la presencia de vitamina C en los alimentos como preservante y antioxidante de los mismos debe cumplir con un porcentaje en masa y un pH no mayor a 4,0. Se considera no necesario el agregar más de la misma, ya que esta disminuiría el pH del jugo a un valor menor a 3,0 y ya no sería del agrado del consumidor ingerir un alimento muy ácido. En la medición de las propiedades fisicoquímicas del almíbar de sacarosa utilizado actualmente en el enlatado de piña. La concentración de sacarosa promedio tuvo un porcentaje de error de precisión de 4,45 %, el pH 3,28 % y la densidad 0,40 %, valores que establecen la confiabilidad de los métodos utilizados y por tanto la de los datos utilizados.

En la variación de la concentración con respecto al tiempo de calentamiento, se obtuvieron variaciones de precisión en las diferentes corridas teniendo como un error máximo de 7,17 % y un error mínimo de 3,76 %. Con respecto al pH presente se obtuvo un error máximo de 4,65 % y un error mínimo de 1,36 %, esto es debido a que el pH se mantuvo estable durante el tiempo de calentamiento. De la misma manera se comportó la densidad del jugo a pesar de que la densidad depende de la temperatura, el error máximo promedio de precisión obtenido fue de 0,42 % y un error mínimo de 0,09 %. Por tanto se establece validez de datos, debido a que ninguno de los procedimientos supera el nivel de confianza del 10 %. El nivel de concentración de sólidos solubles totales promedio presentes en el almíbar y en el jugo del eje de inflorescencia es de 19,852 ºBrx y 19,510 ºBrx, respectivamente. Lo que equivale a una diferencia de 0,342 ºBrx. (figura 6) y un error relativo del 1,72 %. Ya que los almíbares utilizados en la industria utilizan un rango de concentración de 18 a 27 ºBrx, el

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almíbar propuesto cumple con la cantidad de sólidos solubles requeridos.

La densidad promedio del almíbar utilizado en el enlatado y el almíbar realizado a partir del jugo del eje de inflorescencia, tiene una diferencia de 0,0007 g/mL y un error relativo del 0,07 %, valor que no representa variación de densidades entre almíbares, y establece que el almíbar propuesto cumple con la misma propiedad promedio (figura 6). El nivel de acidez presente en el almíbar utilizado actualmente en la industria con respecto al almíbar que se propone (figura 6). Muestra una diferencia de 0,18 en pH lo que establece que el pH del jugo indica mayor acidez y un error relativo de 5,09 %. Por tanto se determina que no hay probabilidad de que exista un crecimiento microbiológico dentro del mismo.

El jugo del eje de inflorescencia como alternativa del almíbar de sacarosa utilizado actualmente en la industria, es una opción viable en nutrientes, ya que el producto que se comercialice sería 100 % natural sin preservantes artificiales. De la misma manera es una opción ecológica, debido a que existiría aprovechamiento mayor de los recursos naturales y contribuiría con la reducción de residuos sólidos en Guatemala y el medio ambiente. Sin embargo, el residuo de la extracción del jugo tendría la misma función que tenían los ejes en sí después de su separación del fruto, como alimentación de ganado.

Conclusiones

1. Fue posible evaluar a escala laboratorio las características del jugo del eje de inflorescencia (*ananás comosus),* proveniente de los residuos sólidos de los productos de la industria alimenticia, como alternativa del almíbar de sacarosa, utilizado en el enlatado de la rodaja de piña, bajo el diseño experimental previamente plantado.
2. Con la extracción del jugo, se obtuvo una disminución de los residuos sólidos obtenidos, debido a que su porcentaje másico de desechos final fue del 0,84 %. Teniendo así un rendimiento másico del jugo del 99,16 %.

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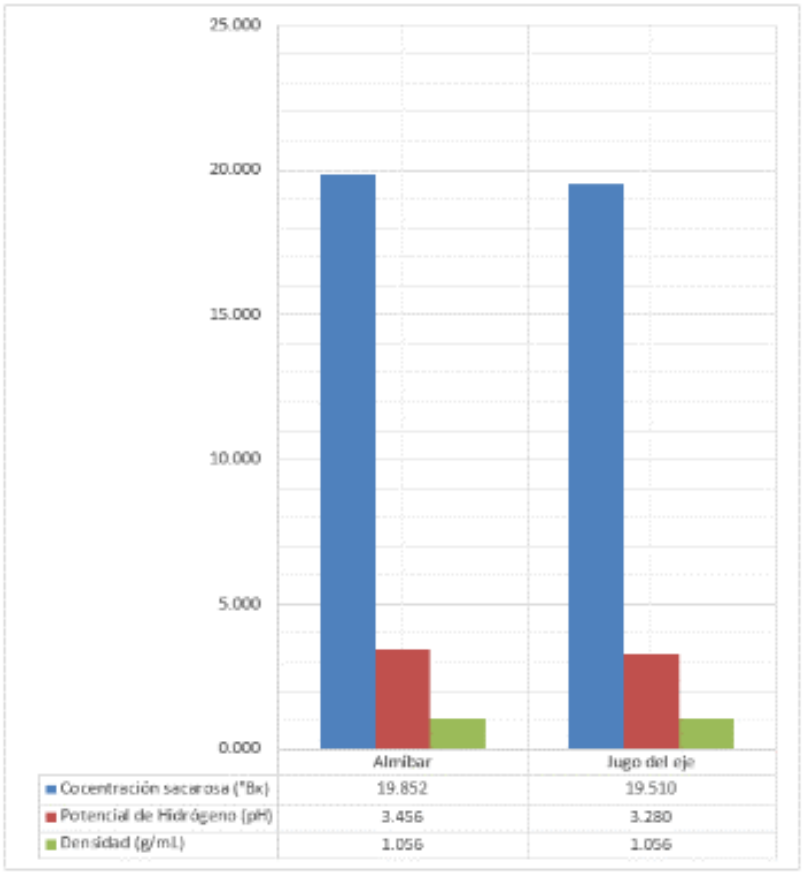

Fuente: elaboración propia, con Microsoft Excel 2013.

Figura 6. Comparación del contenido de sacarosa en el almíbar y en el jugo del eje de inflorescencia con respecto a las propiedades fisicoquímicas.

3. Se aumentó la concentración del jugo del eje de inflorescencia hasta un promedio de 19,510 ºBrx, siendo esta menor a la concentración del almíbar de sacarosa utilizada, con una diferencia de 0,342 ºBrx.

4. La densidad promedio final de las muestras del jugo del eje de inflorescencia a 19,510 ºBrx, muestra una diferencia de 0,0007 g/mL mayor con respecto al almíbar de sacarosa a 19,852 ºBrx.

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5. La densidad del jugo del eje de inflorescencia con respecto al almíbar de sacarosa utilizado se considera aceptable, ya que tiene un error relativo del 0,07 %.
6. En la comparación del comportamiento de la concentración del jugo del eje de inflorescencia con respecto al comportamiento del pH durante el tiempo de calentamiento, se determinó un crecimiento lineal y una estabilidad respectivamente.
7. Debido a que el jugo se mantiene estable durante la concentración del mismo y al incremento lineal de temperatura, no ocurrirán cambios en el nivel de acidez en los procesos de envasado y esterilizado.
8. Siendo aproximadamente un 34,14 % de la vitamina C utilizada en el almíbar de sacarosa, el jugo del eje de inflorescencia cuenta con un nivel de pH menor, es decir el nivel de acidez es mayor.
9. Se obtuvo un comportamiento polinomial de grado 5 en la evaluación de la densidad conforme se da la concentración del jugo, teniendo una correlación de 0,9995, con el propósito de tener un control sobre la misma para cumplir con los parámetros requeridos por el producto.
10. Se determinó que la variación de la concentración de sólidos solubles totales del jugo del eje de inflorescencia con respecto al tiempo de calentamiento es directamente proporcional.
11. El pH del jugo del eje de inflorescencia con respecto al almíbar de sacarosa utilizado se considera aceptable, ya que tiene un error relativo del 5,09 %.y no supera el 10 % de confiabilidad.
12. El jugo del eje de inflorescencia como alternativa del almíbar de sacarosa utilizado actualmente en la industria, es una opción viable en nutrientes, ya que el producto que se comercialice después sería 100 % natural sin preservantes artificiales.

Recomendaciones

1. Utilizar evaporación indirecta por convección térmica para impedir la formación de una textura caramelizada, con el

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propósito de disminuir el porcentaje de agua presente en el jugo y aumentar el porcentaje de sólidos solubles totales en el mismo.
2. Evaluar el efecto que pueda causar la maduración de la piña o la clase de piña, respecto a la cantidad de sólidos solubles totales y al nivel de acidez presentes en el eje de inflorescencia.
3. Realizar un proceso de azúcar extraída de la piña para una mayor conservación de la solución. Reconstituyéndola y utilizarla como reemplazo del azúcar de caña.
4. Monitorear la temperatura de evaporación del jugo, sin que este llegue al estado sólido (caramelo).
5. Evaluar el tiempo de fermentación del jugo con respecto al tiempo de conservación de las rodajas de piña.
6. Evaluar el tiempo de conservación del jugo como almíbar a partir de un cultivo microbiológico.
7. Evaluar otras aplicaciones industriales para el eje de inflorescencia de la piña.

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THE IMPACT OF THE EXPLOITATION OF NON-CONVENTIONAL HYDROCARBONS ON THE ENVIRONMENT

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Abstract: The study aims to determine the impact of hydraulic fracturing on the environment and proposing solutions to produce shale gas that respect the environment in Algeria.

Key words: shale gas, Algeria, environmental assessment, fracturing, damages.

Introduction. Thanks to a relatively high price of natural gas, technological advances and a permissive legislation, natural shale gas is now a resource, considered unusable before, of "unconventional" fuel. It has the same origin as the conventional hydrocarbons. They are formed within the parent rocks through the transformation of sediments rich in organic matter. This latter change over geological time in hydrocarbons. They can then go up either directly on the surface or be blocked by impassable rocks before forming conventional oil reservoirs and / or gas. Or, they may remain trapped in a layer of compact and impermeable rocks called "shale", forming oil and shale gas. These rocks are generally located at depths.

Gas reserves of accessible shale are considerable and regularly revised upwards [1]; particularly the state-of-the-art hydraulic fracturing [2]. If it is essential to recovery shale gas, its use raises many concerns because of the significant environmental impacts that may arise among them [3], the high water consumption and contamination are central to environmental issues.

If the conventional gas is present in the permeable reservoir rocks, shale gas it is trapped in the pores of schistose [4] rendered waterproof by the clay therein.

The extraction of the fossil energy is more complex. Traditional methods cannot be used. To solve this problem, manufacturers have used the method of hydraulic fracturing. However this one is hotly contested [x]. This technique consists of injecting a large amount of high-pressure liquid in the soil to

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fracture the pores of the rock. This fracturing fluid, by its composition, has got hazardous chemicals [9].

Algeria is the second gas supplier to Europe after Russia with 25% of European consumption [x]. But the country has lost market share with the with the arrival of US shale gas and the discovery of offshore deposits in the eastern Mediterranean [10].

Studies by the Algerian company already put forward a perimeter containing shale gas extending over 100,000 square kilometers in Ahnet basin.

Estimates by the engineers announced 200,000 billion cubic meters of gas reserves of which 10% would be recoverable, or 20,000 billion cubic meters.

A study published last summer by the US Department of Energy, Algeria holds the world's third largest reserves of shale gas, behind China and Argentina, but ahead of the USA [11].

Methods and Materials

The study aims to determine the impact of hydraulic fracturing on the environment and proposing solutions that respect the environment in Algeria.

Algeria's tent, naturally enough, to regain share in this sector. to increase by 40% the production of natural gas in the next five years. For this, the authorities rely in particular on shale gas projects. [12]

In Algeria exploration had been launched four months ago by the national company Sonatrach in association with the French Total. However, shale gas is controversial because of its environmental issue today.

Indeed, unlike conventional gas this gas is trapped in shale making it hard and impossible extraction by simply drilling. It is necessary to perform two processes for this: the vertical drilling and hydraulic fracturing as a result of horizontal drilling. Hydraulic fracturing is a technique used to crack the rock by injecting a fluid, called fracturing fluid, at high pressure. This method of natural gas extraction poses risks to the environment:

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- greenhouse gas emission, contributing to climate change globally;
- the use of a relatively large amount of water, between 15 000 and 20 000m3 to realize the hydraulic fracturing in one wall;
- potential pollution of groundwater, soil and surface water at the local level due to leaks caused by leaking wells or loosening of flowback water drilling and hydraulic fracturing that contain toxic chemicals;
- noise, visual and olfactory nuisance caused by the introduction of drilling machines, ancillary facilities and vehicle flow;

- the impact on the landscape
- seismic risks.

Project realization:

In the following tab the different parts breaking our project are listed. The parts are in chronological order:

- Study the implantation site of the shale gas exploitation in Ahnet basin;
- Size the hydraulic fracturing of wells;
- Design a treatment plant and recycling of water from a shale gas well;
- Study the dispersion of pollutants in soils;
- Make a carbon footprint environmental comparison of shale gas extraction processes and conventional gas;
- Mesure risks and impacts and ways to reduce.

The causes of risks and impacts associated with high-volume hydraulic fracturing identified were primarily related to the following challenges:

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- to use of larger amounts of water and chemicals and the lowest yield of unconventional gas wells compared to conventional gas extraction;
- to ensure the integrity of wells and other facilities throughout the lifetime and after mining has stopped;
- to assess the potential toxicity of chemical additives and the challenge of developing more environmentally friendly alternatives, ensuring that chemical spills and wastewater with potential environmental consequences are avoided;
- to identify and make a proper selection of geological sites.
- to measure potential uncertainties associated with the long term presence of hydraulic fracturing fluids in the subsoil;
- to make a list of unavoidable impacts related to traffic and not to be completely avoided;
- to imagine the potential development of these sites over larger areas which are still typical as conventional gas fields;
- to take into consideration unavoidable impacts related to air emissions and noise of installations and equipment under construction and during use.

Discussion.

The risk of these mitigation measures have been identified from the existing or proposed legislation in the US and Canada, where the extraction of shale gas is already effective today. A number of recommendations made by the US Department of Energy are relevant to the regulatory authorities in Europe. In particular, it is recommended that the European Commission acquires a strategic overview of the potential risks.

Recommendations. This study also identified and made recommendations for the management of specific risks related to the high volumes of oil extraction by hydraulic fracturing, namely the implementation of drilling technology and fracturing fluids less dangerous for the environment. The development of more reliable wells, developing better technologies and practices of casing and cementing wells and the use of European database

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available on the composition of hydraulic fracturing fluids must be backed by the research of risk and causes of migration of methane from the extraction of shale gas in groundwater.

Regarding the development of these extractions, the study also revealed a number of potential gaps or shortcomings in the legislation in the world: some that could pose risks to the environment or human health are not sufficiently taken into account; others for which uncertainty arises because of the lack of information concerning the characteristics of projects of large volumes of hydraulic fracturing or aspects for which it is not possible to conclude in this study if or not the risks are properly taken into account in the Algerian government

Conclusion

Shale gas is an unconventional gas, which currently imposes a unique method of extraction: hydraulic fracturing combined with horizontal drilling. Its operations puts countries face choices because it presents contradictory aspects.

The causes of risks and impacts associated with high-volume hydraulic fracturing identified were primarily related to the following challenges:

- to use of larger amounts of water and chemicals and the lowest yield of unconventional gas wells compared to conventional gas extraction;
- to ensure the integrity of wells and other facilities throughout the lifetime and after mining has stopped;
- to assess the potential toxicity of chemical additives and the challenge of developing more environmentally friendly alternatives, ensuring that chemical spills and wastewater with potential environmental consequences are avoided;
- to identify and make a proper selection of geological sites.
- to measure potential uncertainties associated with the long term presence of hydraulic fracturing fluids in the subsoil;
- to make a list of unavoidable impacts related to traffic and not to be completely avoided;

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- to imagine the potential development of these sites over larger areas which are still typical as conventional gas fields;
- to take into consideration unavoidable impacts related to air emissions and noise of installations and equipment under construction and during use.

The negative aspects of the shale gas implementation are being moral and environmental. The positive aspects are purely economic and strategic.

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ЭКОЛОГИЧЕСКИЕ И СОЦИАЛЬНО-ЗКОНОМИЧЕСКИЕ АСПЕКТЫ СТРОИТЕЛЬСТВА И ЭКСПЛУАТАЦИИ НЕФТЕПРОВОДА ЧАД-КАМЕРУН

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ENVIRONMENTAL AND SOCIO-ECONOMIC ASPECTS OF BUILDING AND OPERATION OF CHAD- PIPELINE

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Abstract: In this paper, we look into the goals and objectives of the project construction and exploitation of the oil pipeline Chad – Cameroon through the territory of Cameroon. The main focus is on aspects of ecological risks due to the exploitation of the oil pipeline. Social and economic characteristics of this project are studied.

Key words: Pipeline, Aims and objectives of the project, Chad-Cameroon oil, environmental risk, social, and economic characteristics.

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В статье рассматриваются цели и задачи проекта строительства и эксплуатации нефтяного трубопровода Чад – Камерун через территорию Камеруна. Большое внимание уделяется различным аспектам экологического риска эксплуатации нефтепровода. Приведены социальные и экономические характеристики этого проекта.

Ключевые слова: нефтепровод, цели и задачи проекта, Чад – Камерун, экологический риск, социальные и экономические характеристики.

Доля Африки в планетарном масштабе добычи руд и минералов колеблется в период с 1980 по 2000гг. от 6 до 13,5% от общего мирового объема [5]. Данные по нефтяной промышленности в Африке отражают аналогичную тенденцию [15].Африканские страны вкладывают все больше средств в сектор добычи и увеличение экспорта нефти.

Начиная с 1969 года были разведаны запасы нефти на юге Чада в районе Доббаи, которые оцениваются в 900 млн. баррелей [12].

Гражданская война, разразившаяся в 1979 году, а также отсутствие финансовых ресурсов и необходимого опыта в нефтяной промышленности, не позволяли Чад эксплуатировать разведанные месторождения. В 1988 году Чад подписали соглашение на право разведки до 2004 года с консорциумом Exxon, Shell и Эльф [16]. В это соглашение в 1995 году были внесены поправки. В нем, в дополнение к изучению и эксплуатации разведанных месторождений были включены вопросы по охране окружающей среды, компенсации вреда для здоровья людей, проживающих на территории нефтедобычи и транспортировки нефти, а также выплата роялти (плата за право разработки и добычи нефти) и налогов. Хотя проект предполагает эксплуатацию Чадом месторождения нефти, успех этого проекта в значительной

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степени зависит от Камеруна. Это связано с тем, что Чад не имеет выхода к морю. Он не имеет и судоходных рек.

Поэтому в 1996 году Чад и Камерун подписали двустороннее соглашение, которое предусматривает строительство нефтепровода через Камерун (рисунок 1) [11]. Трубопровод начинается с месторожденя на территории Доба на юге Чада и проходит через Камерун до города Криби на Атлантическом побережье, где происходит загрузка танкеров. На территории Камеруна, он влияет на 5 провинций, 12 департаментов и 242 деревень (рисунок 2) [14].

Нефтяной проект Чада с нефтепроводом Чад-Камерун является одним из крупнейших проектов к югу от Сахары, когда-либо проводившихся в Африке. Его общая протяженность 1070 км.

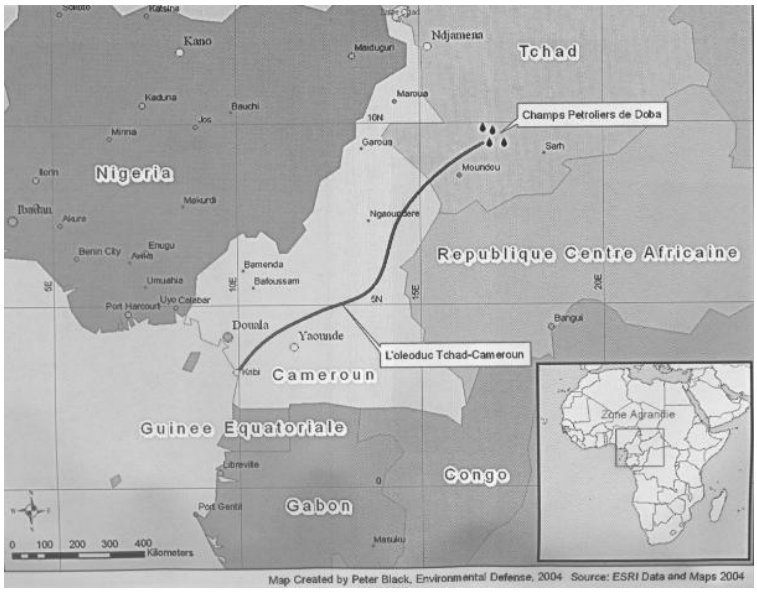

Рисунок 1. Трасса нефтепровода
на территории Камеруна и Чада [11]

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Этот проект, как ожидается, обеспечит в течение 30 лет доход Республике Чад (налоги и сборы, отчисления от продаж и прибыль) в размере 8,5 млрд. долларов США (5100 млрд. франков КФА и доход Республике Камерун (транзитные пошлины, транспортные налоги и льготы по капитальным вложениям) в 900 млн. долларов США (540 млрд. франков КФА) [2]. Эти доходы будут содействовать в обеих странах социальному развитию (создание школ, медицинских центров, строительство автодорог с твердым покрытием), включая организацию служб экологического контроля и создание систем охраны окружающей среды. Планируется увеличение дохода в сельском хозяйстве, животноводстве и рабочих мест в инфраструктуре нефтепровода и строительстве.

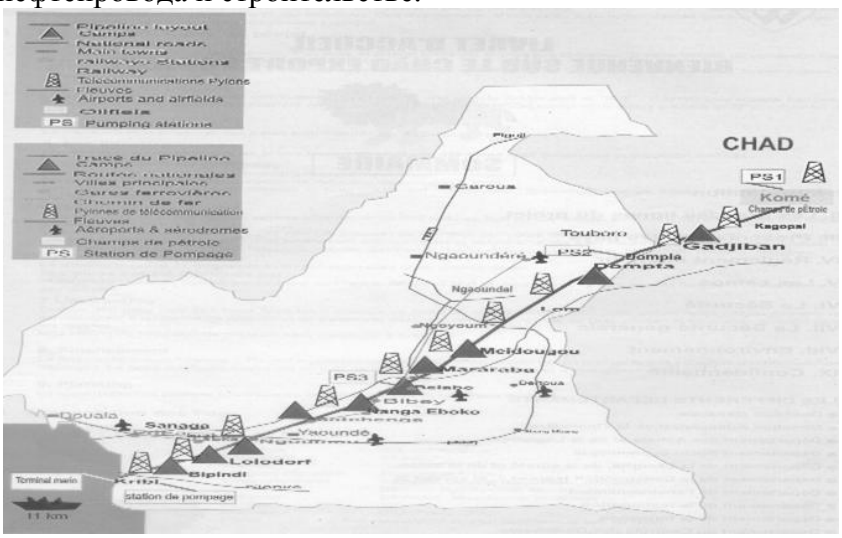

Рисунок 2. Трасса нефтепровода
на территории Камеруна [14]

Всемирный банк развития в качестве контролера играет центральную роль в проекте создания и эксплуатации нефтепровода, а также в качестве поручителя и спонсора. Он обеспечивает участие общественности заинтересованных

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стран в обсуждении экологических и социально-экономических аспектов программы.

Всемирный банк развития планирует активно влиять на проект на всех стадиях его функционирования [16]. Роль Всемирного банка важна для обеспечения целевого использования выделенных средств. Так как французские парламентские комиссии в 1999 обнаружили, что доходы от продажи нефти часто используются для финансирования военных операций, и являются причиной социальной нестабильности и коррупции в регионе [9]. Доходы от эксплуатации нефтяных месторождений Чада должны способствовать борьбе с бедностью в этих двух странах. Тем не менее, этот проект сопряжен и с отрицательным влиянием на природную и социальную среду региона, т.е. с экологическими рисками [16]. Эти риски включают в себя нарушение геологических и биологических компонентов экосистем территории, отторжение у крестьян сельскохозяйственных земель (более 5000 га), а так же риск разлива нефти. Все эти изменения окружающей экологической и социальной среды будут отрицательно влиять на здоровье жителей.

Перечисленные изменения являются компонентами экологического, экономического и социального развития Чада и Камеруна. Динамику этих изменений важно знать для разработки необходимых корректирующих мероприятий, способных улучшить жизнь населения обоих стран.

Воздействие на окружающую среду Камеруна нефтяного трубопровода.

Нефтяная промышленность производит целый ряд отрицательных воздействий в регионе прокладки нефтепровода на здоровье населения, а так же на биоразнообразие растительных и животных организмов [7].

Вырубка леса. В 2005 году, Янез с *соавторами* отметил, что прокладка нефтепровода Чад-Камерун в

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Камеруне приведет к уничтожению лиственного леса на площади 2867,87 га, на площади 954,74 га - полу-лиственного леса, на 245,22 га - смешанного леса и на 549,66 га мангрового леса на Атлантическом побережье [17].

Леса являются бесценным активом для человечества, как производители кислорода, флоры и фауны. Лес дает населению плоды, семена, кору, мясо, строительные материалы и дрова [13].

Лес обеспечивает 25% экспорта Камеруна и вносит существенный вклад в ВВП (в размере 7,1%) [3].

Биоразнообразие. Вырубка лесов приводит к утрате биоразнообразия. Большинство наземных животных и птиц покидает места обитания и это существенно влияет на продовольственное обеспечение коренного населения [17].

Причиной этих миграций является уменьшение кормовой базы, шумовое загрязнение и интенсивная охота работников и субподрядчиков эксплуатации месторождения и нефтепровода.

Почвы. *Янез* и *соавторы* сообщили, что обычно на почве инфраструктуры нефтедобычи происходят существенные изменения поверхностной части, и эрозия почвы. Эти изменения являются следствием уничтожения растительности, загрязнения различными неорганическими соединениями (сульфатами и солями), и компонентами нефти (углеводородами, включая канцерогены) [17].

Эти авторы сообщили о деградации почвы вдоль трассы трубопровода в результате эрозии. Они выявили сорок восемь территорий подверженных эрозии: 91% в саванне, 9% в области леса. В этой работе отмечается, что почва, находящаяся под воздействием нефтепровода оказалась непродуктивной и была заброшена владельцами. В результате 76,38 га сельскохозяйственных угодий были потеряны.

Вода. В селе Луавилл в Огони, уровень нефтяных углеводородов в реке достигает 18 г/м^3. В водах дельты

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Нигера содержание нефтяных углеводородов колеблется в пределах от 8 до 60 г/м^3 [6].

Нефтяное загрязнение содержит бензол, ксилол и полициклические углеводороды, которые являются канцерогенами.

На побережье Камеруна, танкеры используют воду из Атлантического океана, чтобы очищать танкеры от нефтяных загрязнений. Эта вода, как правило, выбрасывается в океан и разносится потоками вдоль всего побережья [10].

Здравоохранение. Янез с *соавторами* [17] отмечает, что здоровье коренных народов, проживающих в области инфраструктуры добычи нефти, напрямую связано с этой деятельности. Они считают, что здоровье этих людей, как правило, хуже, чем у населения, не проживающего на этих территориях.

Загрязнение воды и воздуха тяжелыми металлами у жителей области добычи нефти являются причиной таких заболеваний, как астма, кишечные расстройства, рак, нарушение зрения. Вива установил, что высокая частота заболеваний дыхательных путей (астма, бронхит, туберкулез), кожных заболеваний и рака на территории Огони больше, чем в других районах [15].

Эмигранты из нефтяного сектора несут с собой болезни, которые инициируют эпидемии (тиф, корь, холера, гепатит, туберкулез). На территории этого сектора из-за застоя воды болеют больше малярией.

Данные национального комитета по борьбе со СПИДом (CNLS), приведенные Дыуде свидетельствуют о том, что распространенность ВИЧ выше, вдоль трассы трубопровода (на 19,8%), чем в других регионах Камеруна [4].

Сельское хозяйство. Согласно Малькольм [8] сельское хозяйство играет важную роль в экономическом развитии Камеруна. Сельское хозяйство составляет 59% экономически активного населения.

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В развивающихся странах, сельское хозяйство создает рабочие места, обеспечивает поступление иностранной валюты, удовлетворяет потребности местного спроса на продовольствие и запасы сырья для промышленности.

Министерство сельского хозяйства (MINAGRI) утверждает, что сельскохозяйственный сектор обеспечивает 50% валютных поступлений в Камеруне. Поэтому очевидно, что сельское хозяйство стимулирует экономическое развитие.

Однако перечисленные выше отрицательные изменения окружающей среды (вырубка леса, изменения биоразнообразия, воды, почвы) и сельскохозяйственных территорий под влиянием инфраструктуры нефтедобычи, в конечном счете, ощутимо влияет на экономику этих стран.

Выше изложенный материал позволяет считать, что при строительстве и эксплуатации всей инфраструктуры нефтедобычи необходимо предусмотреть такие первоочередные мероприятия, как:

1. разработку и ведение системы мониторинга экологических и социальных изменений на территории инфраструктуры нефтедобычи;

2. обязательное формирование целевых фондов для компенсации отрицательных изменений всех компонентов окружающей среды.

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THE COMPARATIVE ANALYSIS OF THE METHODS PROVIDING ECOLOGICAL SECURITY OF GAS AND AIR EMISSIONS (BASED ON THE WORK OF WASTE INCINERATION PLANT (WIP) №2, MOSCOW, RUSSIA AND WIP INGOLSTADT, GERMANY)

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Abstract: The amount of solid municipal waste is increasing. Municipal solid waste is incinerated to produce electrical energy. Waste incineration plants pollute the air.

Key words: waste incineration plant, municipal solid waste, the best available technology, sanitary protection zone, pollutants.

Due to the growth of consumption there has been a considerable increase in solid municipal waste (SMW) production. It is not considered to be possible to continue burying it, thus the main modern way to utilize SMW is to burn it obtaining thermal electrical energy. The aim of the study is to analyze and compare ecological security of waste incineration plants in Russia and Germany considering the permissible

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concentration of the substances in the release and to develop extra measures for the atmospheric air protection.

The objects of the study are WIP №2 in Moscow and the German incinerators in Ingolstadt.

The fire box of both plants is equipped with a back pushing furnace grid of the German system "Martin". The combustion control system at the German plant is also supplemented with an infrared camera, installed in the ceiling of the boiler above the grid. It covers and extends the main combustion zone, maintaining the desired temperature, resulting in a steadily burning out slag.

At WIP №2 the gas emission purification system includes 4 stages: DeNox equipment, an acid gases neutralization reactor, a hose filter, and activated carbon supply to the flue [1]. The gas emission purification system at WIP in Ingolstadt is a multi-step process including a tissue and electrostatic filter, a scrubber, reheating, catalyst equipment and a forced draft [2]. This fact explains the difference between quantitative and qualitative composition of emissions of the plant.

The analysis of the legal and regulatory framework of the Russian Federation and Germany in the field of quantitative and qualitative monitoring of emissions was held. It has been shown that in Russia concentrations of substances permissible in the release are measured on the border of the sanitary protection zone (SPZ), this value must not exceed the hygienic standards prescribed by the law [3]. In Germany, there are emission standards for each type of production, which are included in legal acts. Their monitoring is performed directly at the source of emissions (the mouth of the pipe) [4].

Table 1 shows the emission data of WIP №2 and the WIP in Ingolstadt, and the MAC of pollutants in accordance with the legislation of the Russian Federation and Germany.

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Table 1 WIP emissions in Russia and Germany as compared to the regulations [1, 2, 3, 4]

Substance	**Russia**		**Germany**	
	WIP №2, mg/m^3	**MAC, mg/m^3**	**WIP in Ingolstadt, mg/m^3**	**MAC, mg/m^3**
Non-toxic dust	4,3	10,0	2,0	10,0
NO_x	56,9	85,0	92,0	200,0
CO	12,5	5,0	5,0	50,0
HCl	2,8	10,0	2,0	10,0
HF	0,12	1,0	0,2	1,0
SO_2	26,1	50,0	10,0	50,0
Dioxins	0,006 pg/m^3	0,5 pg/m^3	0,0037 pg/m^3	0,1 pg/m^3

According to the table WIP №2 has a higher concentration of emissions allowable for these substances, such as: non-toxic dust, carbon monoxide, hydrogen chloride, sulfur oxides (IV), dioxins.

The analysis of the data shows the need to increase the number of stages of gas cleaning or to replace the existing equipment with more modern one. As a result of the comparison it has been found out that the most effective filter with the largest size range of particles to be removed is an electrostatic filter. The comparative analysis of the existing methods demonstrates that the most economically and environmentally beneficial way is to increase the effectiveness of the existing reactor of neutralization by improving the quality of the applied lime. The mass fraction of active CaO + MgO in the lime should not be less than 80 %.

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TECHNOLOGICAL AND ECOLOGICAL ASPECTS OF EXPANDABLE POLYSTERNE (EPS) PRODUCTION

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Abstract: Polystyrene is unique material, one of the important products of organic chemical industry. This article discusses the advantages and disadvantages of expandable polystyrene from environmental and technical point of view.

Key words: styrene, vinylbenzene, polystyrene, expandable polystyrene, suspension polymerization, block polymerization.

It`s know that styrene is the active monomer forming the polymer relatively easily by all known methods of radical polymerization. This was the basis for the development of industrial production of polystyrene. [1]

Prospects for the development of consumption of expandable polystyrene products (EPS) on the market is

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associated primarily with the development of the construction industry. The Federal law (from 23.11.2009 No. 261-FZ “About energy conservation and energy efficiency and addition of amendments to some legislative acts of the Russian Federation”) formed a new trend in Russian construction: first time producers felt the genuine demand for energy-and resource-saving technologies. Moreover, the parallel movement of the Greens has set another task to combine the efficiency of technologies with safety for man and the environment.

These factors forced the producers of building materials, and experts of design and construction spend a lot of resources to search for materials that meet these requirements. At the same time, most experts in the construction industry admit that the market is long-lasting and energy-efficient materials has already represented, and search any innovation is only marketing strategy, rather than an essential necessity. [2] Polystyrene is material with well estimated and proved properties.

The main advantage of polystyrene is facility accommodate high mechanical force at minimal density. This property defines possibilities of polystyrene using in construction industry. Up to date there are set of problem constraining the producers.

Manufacture use the out-of-date technologies which are based a method of suspension polymerization. [1] Method based are weak solubility of vinyl monomers in water and a neutrality of water of polymerization. Feature of this method consists in a partial continuity of process of manufacture. Process proceeds in capacities with a mixer inside and volume up to fifty cubic metre. The distilled water assists receiving of suspension of styrene. The catalyst add in drops a monomer where a basic process. Is proceeded result - granulation of substance. Under a high pressure suspensions lead up to 130°C within fifteen hours. Applied centrifuges allow separating foaming polystyrene from the received structure. For extractible washing and drying of granules followed centrifugal separation. Advantages of

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suspension polymerizations are easy mixing of reagents and the rationalized heat removal.

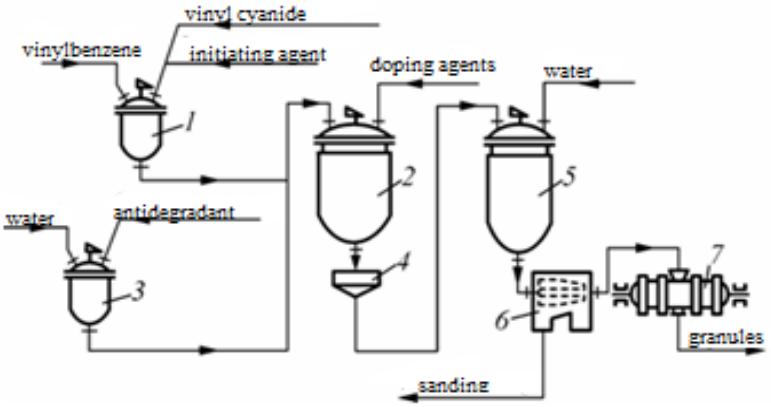

Fig. 1. Production Scheme suspension of polystyrene (and blended polymer of styrene) method in a batch stirred reactor: 1-process vessel for monomers, 2-vessel, 3 - process vessel for 4 - sieve membrane, 5 - intermediate storage; 6 - centrifuge; 7 - drying compartment. [3]

Modern technologies of output are based on use of the foaming polystyrene received by continuous polymerization in weight. Incomplete conversion of monomers by manufacture guarantees high economic and technical parameters, and application of polymerization in weight provides the optimal diagram of a work cycle. The production cycle goes under the continuous diagram that is caused by availability of several informed devices with mixers, and last from them is executed in the form of a column. The first stage of chemical reaction passes at 90°C. Synthesis comes to the end at 200-220 °C. Process stop at achievement of end production of ≈90 % from weight of originally loaded raw material. Other part of not reacted substance delete by means of vacuum installation. A following production phase - addition in the received weight of stabilizers. Followed by granulation.

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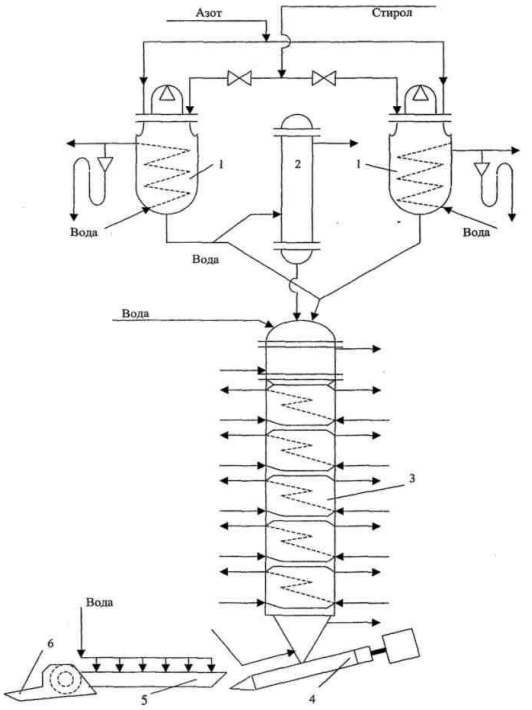

Fig.2. Scheme of polystyrene obtained by continuous bulk polymerization: 1-preliminary polymerization vessel; 2- cooling compartment; 3- vertical tower; 4- extruding press; 5 - bark; 6- attritor. [3]

This technology virtually eliminates waste, because the unreacted part of a by-product substance is again involved in the technological cycle. All techniques and processes that accompany cycle, provide the ability to control the temperature, increasing reaction rate, heat removal. However, this method of production of expandable polystyrene is still complex and costly, forcing more use the method of suspension polymerization.

Around the production of expandable polystyrene and its use in building and civil engineering continues constant controversy. Primarily, this is due to lack of awareness of current data, the results of ongoing trials and the availability of permits.

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One argument against the use of polystyrene in the construction is the fact that a polystyrene obtained by polymerizing styrene. It is believed that the expanded polystyrene is subjected to continuous oxidation by oxygen, and thus allegedly is released styrene into the environment. However, such statements are baseless and ignorant, as in a normal operating EPS will never be oxidized. Depolymerization styrene can indeed proceed at temperatures above 320 ° C but seriously talk allocation styrene in polystyrene blocks during operation in the temperature range from -40 to 70 ° C is impossible.

As a further argument against the use of polystyrene foam used in the construction of the statement of its high flammability. [2] Styrofoam is really combustible material, which imposes on its use to certain restrictions. But they must be aware of the builder, as regulated in the existing GOST 15588-86. [4] And still the problem of burning of expanded polystyrene today is solved at a stage of a compounding due to various additives антипиренов which sharply reduce danger of ignition and possess capacity to self-attenuation at removal of a source of fire.

Now problems with which collides the petrochemical enterprises by manufacture of expanded polystyrene, are not connected with a material. These problems are connected more likely with imperfect normative and research base of building materials. Apparently, that it is possible to consider use of expanded polystyrene more than perspective by virtue of absence of costing alternative. The build-up of the European integration experience, the development of new standards and improvement of production technologies should favorably affect the prospect of development of expanded polystyrene products.

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THE LIFE CYCLE OF THE PRODUCT AS AN EXAMPLE OF COMPLEX USE OF WASTE PAPER

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Abstract: For realization the life cycle of the product as an example of complex use of waste paper, we conducted comparative analysis of various substances and procedures that prevent rupture cycle. It was revealed that the life cycle of paper can not be "closed" (the whole paper, which became the paper, turn into a useful product to be recycled), because it is influenced by many factors.

Key word: Waste concern question worries all the humanity. The most effective way of dealing with various types of waste is recycling. Of the total amount of waste which is transported to the landfills about two-thirds can be used again.

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The aim is to examine the life cycle of the waste paper as an example of complex use of a product and to find all the weaknesses in its implementation.

How is Paper Recycled?

- ***Sorting***

  Successful recycling requires clean recovered paper, so you must keep your paper free from

contaminants, such as food, plastic, metal, and other trash, which make paper difficult to recycle. Contaminated paper which cannot be recycled must be composted, burned for energy, or landfilled.

- ***Collection and Transportation***

At the recycling center, the collected paper is wrapped in tight bales and transported to a paper mill, where it will be recycled into new paper.[1]

- ***Storage***

Paper mill workers unload the recovered paper and put it into warehouses, where it is stored until needed. The various paper grades, such as newspapers and corrugated boxes, are kept separate, because the paper mill uses different grades of recovered paper

to make different types of recycled paper products.

- ***Re-pulping and Screening***

The paper moves by conveyor to a big vat called a pulper, which contains water and chemicals. The pulper chops the recovered paper into small pieces. Eventually, the old paper turns into a mushy mixture called pulp.

- ***Cleaning***

Mills also clean pulp by spinning it around in large cone-shaped cylinders. Lighter contaminants collect in the center of the cone and are removed. This process is called cleaning. [1]

- ***Deinking***

Sometimes the pulp must undergo a “pulp laundering” operation called deinking (de-inking) to remove printing ink and

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"stickies" (sticky materials like glue residue and adhesives). Papermakers often use a combination of two deinking processes.

- ***Refining, Bleaching and Color Stripping***

During refining, the pulp is beaten to make the recycled fibers swell, making them ideal for papermaking

- ***Papermaking***

Now the clean pulp is ready to be made into paper. The recycled fiber can be used alone, or blended with new wood fiber (called virgin fiber) to give it extra strength or smoothness.[1]

What can be made from recovered paper?

Most recovered paper is recycled back into paper and paperboard products. With a few exceptions, recovered paper is generally recycled into a grade similar to, or of lower quality than, the grade of the original product. For example, old corrugated boxes are used to make new recycled corrugated boxes. Recovered printing and writing paper can be used to make new recycled copy paper.

Recovered paper can be used in a variety of other products as well. Recycled pulp can be molded into egg cartons and fruit trays.

Life cycle of waste paper – is the production, processing and waste consumption of all types of paper and cardboard, which is suitable for further use as fiber raw material.

The life cycle challenge is to return of maximum amount of the substance into the process of production, so as to the waste will be lowed.

For this purpose I examined all the stages of life cycle of waste paper from its collection to reception the final product.

One of the uses of waste paper is the production of paper cups for seedlings. The main implementation problem is that over time they develop microorganisms that spoil the trade dress and, therefore, consumers refuse to purchase it.

Recommendations and conclusions could be:

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• The maximum possible replacement of old equipment with new, or a major overhaul can be the solution to the problem of obsolete equipment;

• To avoid contamination of equipment glue, you must use the latest sizing agents and fresh types of paper and cardboard;

• To avoid deterioration of the quality of raw materials after a few cycles, it is necessary to sort it from several marks and clean from a variety of contaminants;

• It is established that the most appropriate way to destroy micro-organisms and fungi, break down cellulose is their treatment with a solution of copper sulphate and AgBion;

• It revealed that the degree of processing and the quality can be improved by using new promising devices technologies bleaching and removing ink and other impurities from waste paper, the latter sizing materials.

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GREEN BUILDING

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THE USE OF "GREEN OFFICE" TECHNOLOGY TO PROVIDE RESOURCE-SAVING OPERATION OF OFFICE SPACE

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Abstract: Based on foreign experience, a method for the estimation of the influence of office operations on the environment was developed. An analysis of heat, water and energy power wastes in office space was made. This prompted several measures of eco-economical modernization of priority areas of office operations. In result, measures for the greening of office space were developed and implemented.

Key Words: Green office, electric power, heat power, formation of wastes, waste, solid waste

Office operations influence directly and indirectly the environment, namely: the consumption of electric power, heat power, water, formation of wastes, use of plastic production, consumption of paper and cardboard production, etc.

On the basis of foreign experience analysis in the area of office resource-saving and management of office wastes a method of influence of estimation of office operations on the environment and the analysis of heat power wastes, energy power wastes and water wastes sources in office space was offered and also several measures of ecological-economical modernization of priority areas of office operations were proposed.

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Based on the researches results measures of office operations greening in chosen office were worked out and implemented according to the following target directions.

The objects of the study: office spaces of business center "Obnovlenie Arbata".

Office paper is the main waste of offices that reaches 45% of House Hold Waste (HHW). On the basis of aggregate statistic data the average costs of office paper (size A3 and A4) in big offices could reach 1000 lists per person per month. According to statistic data the use of 1 ton of office paper is equivalent to cutting down approximately 20-25 trees, namely approximately 10-120 square meters of forest.

The application of the offered resource-saving practices in the use of office papers brings to reduction to 25% of total consumed value and allows to save more than 500 000 rubles per year. It is possible to reduce the negative influence of office operations for example, by the use of office paper produced according to ecological standards (purchase and use of paper that has international certificate FSC).

In toilets and kitchen areas paper towels are usually used to dry hands quickly. Paper towels are not used for recycling and are the waste that in most cases is buried. The problem of high consumption of paper towels can be solved in 2 ways:

- Implementation of office consumption standards and office stuff motivation to realized the need of consumption (use of notices, banners and other means of visual agitation),
- Total or partial refuse to use paper towels after installation of electric driers for hands.

Annual value of plastic dishes use in the world is more than 100 000 000 tons, most part of which goes to a dump where it is doomed to storage for hundred years in primeval form. Plastic that is dirty with meal is usually located on landfills. From

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ecological point of view the most possible alternative of plastic dishes are reusable dishes and not cardboard dishes.

As it is shown according to made calculations the transfer to use of reusable dishes will allow to reduce costs to 93% and to reduce formation of wastes almost to 9 tons per year.

The main objects of water consumption in offices are toilets, heating systems and air conditioner systems, kitchens.

The main determined reasons of ineffective water consumption in offices are:

- Physical tearing and leakage of sewers,
- Lack of water-saving water taps and systems of drain of toilet sink,
- Lack of water-saving household appliances.

The reduction of water consumption in office buildings can be reached by several ways. First, installation of meters of hot and cold water consumption to provide monitoring.

Second, reduction of average water consumption by office stuff by installing water-saving equipment. The use of aeratic attachments for water taps that allow to mix water with air reducing water consumption and making it softer. Using such aeratic attachments water consumption can be reduced to 6-7 liters per minute. As it is shown according to made calculations the implementation of proposed measures will allow to reduce water consumption in an office to 21% that will allow to save 263 000 roubles per year.

Costs for lighting of office spaces reach 44% of total used value of electric power in offices.

Made research allowed to reveal the following main reasons of high electric power consumption:

- Lack of proper regulation of schedule cutoff/switch on of common lighting,
- Ineffective use of lighting in nonworking areas,
- Lack of practice of use of energy-saving lamps and automatic systems of light control.

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Significant reduction of electricity consumption costs is possible by using energy-saving lamps. Tubular fluorescent lamps that are in the office could be modified by changing of starting device. Made calculations showed that almost 1,5 mln. per year can be saved only due to implementation of electronic control gear.

Antiseptic packing Tetra Pak, SIG, EloPak and other similar brands is used for main liquid products – milk products, juices, fruit drinks and etc. Accordingly main values of this packing stored as a composition of Hard Domestic Waste (TBO) in office centers. According to made calculations separate collection of packing Tetra Pak will allow to reduce weight of wastes to 1 ton per year.

Till the present moment in Russia there has not been organized any system of used accumulator batteries collection. Batteries are dangerous wastes and should be utilized separately from household rubbish. Special containers should be used to collect them in offices and to transfer it. Arrangement of used batteries collection helps to avoid environmental pollution with heavy metals.

Based on made researches the following conclusions were made:

- Step-by-step method of consecutive estimation of office operations influence on the environment was worked out. This method had a partial approbation on the chosen object of research.
- Based on shown estimation of office spaces in business center “Obnovlenie Arbata” (in Moscow) there were revealed the main directions of office operations that stimulate ineffective use of resources and increased formation of solid household wastes that influence the environment. They are: non-rational use of paper of different purposes, ineffective energy and water consumption, lack of separate collection of waste.

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- Based on foreign resource-saving practices analysis (European Union, USA, Great Britain) practical measures were offered that allow to reduce negative influence of office operations and also to reduce economical costs of management in office companies.

It was proved that proposed list of measures on electric power and water saving, on plastic use, quantity of formed wastes reduction and paper consumption reduction will result in saving of energy, water and raw material recourses with calculation summarized economical profit about 3.880.000 rubles a year.

Most measures of greening in different office operations directions have payback period from 2-3 till 14 months. The number of measures does not need financial costs and can result in direct ecology-economical profits.

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ANALYSIS AND ASSESSMENT OF THE LIFE CYCLE OF PRODUCTION OF THERMAL INSULATION FROM MINERAL WOOL, FLAX AND EXPANDED POLYSTYRENE USING GABI 6 SOFTWARE

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Abstract: The life cycle of construction materials includes all stages of production starting with raw materials, transport, material manufacturing and the installation in the built environment, subsequent operation, disposal or reuse. The production of construction material is the most significant in carbon accounting terms. For this reason in today's market of energy efficient and sustainable construction materials, preference is given to materials with a low carbon production footprint.

Key words: green building, life cycle assessment, thermal insulation, sustainable building materials, mineral wool, flax insulation, expanded polystyrene, carbon footprint, GABI 6

Introduction. The rational use of resources, energy efficiency, minimization of environmental impact, the creation of favorable microclimates in residential and commercial buildings

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are all major trends in the world construction market. Innovative construction materials play an increasingly important role in ensuring energy efficiency and environmental protection in buildings.

One of the important elements of green building is the use of energy saving technologies and materials, including insulation materials. Life cycle of the production of such insulation materials quantifies the size of their carbon footprint.

The contribution and the relevant importance of an accurate carbon footprint as a method to determine the choice of sustainable insulation materials is uncontestable and therefore research in this field is appropriate.

The objective of this research is to calculate a carbon footprint and to assess and compare the impact of the life cycle of production of insulation materials made from mineral wool, expanded polystyrene and flax on the environment.

Methodology. In the Russian Federation life cycle analysis (LCA) is based on ISO environmental standards - ISO14040, 14041, 14042 and 14043. The purpose of a life cycle assessment (LCA) is to capture the impact of all production stages in an assessment relating to environmental impact, calculating equivalent CO2 incorporated. The main categories of impacts on the environment are use of resources, human health and the natural environment.

Life Cycle assessment (LCA) includes four stages:

1. Goal and Scope Definition

At this stage the aim, subject, limitations, main directions and procedures of carrying out an assessment of life cycle are defined. The purpose and area of research establish the appropriate method and order of assessment, determining the data format which is subject to research [1, 2].

2. Life Cycle Inventory (LCI) – What's embedded in the product?

The inventory analysis includes data collection and calculation procedures for the purpose of quantitative definition

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of the corresponding input and output data flows from the production system. Incoming and outgoing streams include the use of resources, atmospheric emissions, any discharges into watercourses and the earth connected with system [3].

Life Cycle Impact Assessment (LCIA) – What effects does it have?

The influence assessment phase when carrying out an assessment of life cycle is directed on an assessment of the importance of potential impacts on environment by results of the inventory analysis of life cycle [3].

Data Interpretation – What does it all mean?

Interpretation of life cycle – the systematic procedure of identification, classification, validation – an assessment of the information received as results of the LCA of the production system, and representation of these results to meet the requirements set out in stage one [4].

Thus, the LCA method forms only one of several decision making tools, for example, for information (documenting existing systems), improvements (introduction of changes in the existing production systems) or the development of new production systems.

The GaBi6 software was chosen as a tool for data analysis for this study.

GaBi 6 was created by the German company PE International. According to PE International GaBi GaBi is the world's leading Life Cycle Assessment (LCA) modelling and reporting software [5].

The program allows environmental impact assessment, estimation of production processes analyzing: carbon footprint, impact on an ozone layer, ecotoxicity, etc, creating datasets for future analysis.

The program allows the modelling of various processes and productions, to estimate the life cycle of a product and to develop actions to decrease production impact on the environment.

Insulation materials

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A. Mineral wool

Mineral wool is one of the most widespread thermal insulators in the construction and other industries. It incorporates crushed mineral raw materials fastened with a binding. From the point of view of heat-insulating properties, mineral wool – is one of the most effective heaters, heat conductivity – 0,036 W / (m • K), an excellent indicator. Mineral wool also has advantageous fire resistance properties compared to other types of natural insulators as well as acting as a vapor barrier [6, 7].

In addition to these environmental pluses is the fact that ample raw materials for production of mineral wool exist in the form of natural rock and slag. The disadvantage of mineral wool is that production is energy intense (599-700 kJ/kg) and creates air-bound emissions of dust, ashes and chemical binders (phenol, formaldehyde) that calls into its otherwise environmental advantages [6, 7, 8].

In its use, mineral wool can also have a negative impact on human health of installers and the microclimate of a building. These stem from the components which are a part of binding material. Sheets of mineral wool emit phenol and formaldehyde and (as it often happens), if not properly installed, polluting the interior environment [7, 8, 9].

B. Expanded polystyrene (EPS)

Expanded polystyrene represents a thermal insulation material manufactured from foam polystyrene. Manufacture includes introducing polystyrene "beads" into high-boiling liquids (an isopentane, dichloromethane and etc.) and subsequrnt heating.

The raw materials for production of expanded polystyrene are from finite resources – currently made from oil products. Also production is followed by considerable energy consumption [10].

According to the academician of the Russian Academy of Natural Sciences V. V. Maltsev EPS is one of the most unhealthy and dangerous of construction materials. Summarized, EPS negative impacts on human health include:

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First - EPS beads' heat-insulating properties deteriorate over time. This is due to the fact that EPS is almost impenetrable by steam. Interior domestic environments contain significant concentrations of water vapor - from household appliances and from the human behavior (on average, the person emits about 100 g of vapor per day), which is slightly absorbed by expanded polystyrene over time, changing their thermo-dynamic properties [10].

The second concerns EPS's toxic air-bound emissions. All polymers contain chemical components and expanded polystyrene is no exception. Polymerization of polystyrene occurs in 97-98% of the material. The remaining 2-3% is a free styrene contained in the product and free to be emitted into the interior environment. Moreover, under the influence of external factors (oxygen, heat, water) polymers constantly decay to styrene. [10].

Thirdly, expanded polystyrene is flammable. Expanded polystyrene has a G4 class of combustibility (high combustibility). Use of materials of a class of combustibility of G4 isn't forbidden by construction norms of the Russian Federation, however it must be kept in mind that it is a certain risk. When burning expanded polystyrene a highly toxic gas sarin is released. Sarin can cause asma with as little as inhaling a few breaths[10].

These factors indicate a sufficient environmental danger for EPS.

C. Flax insulation

This type of insulation is made of flax fibers and represents a natural and environmentally neutral material. Bindings of polymer or starch are used similar to the structure of linen. Use of potato starch as binding is even possible, making the insulator 100% natural. However it must be noted that the binding substance's significance is limited as it amounts to around 10% of the total product [6, 7].

The importance of the environmental safety of materials used in insulation is obvious. Production of this material doesn't

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demand a large amount of energy therefore the carbon footprint of linen-type insulation is much lower than that of mineral wool and expanded polystyrene. Moreover, flax is from an infinite, renewable resource [6, 7].

The linen-type insulation is durable and hygroscopic. This implies that, despite prolonged exposure to water, the material doesn't lose its shape and after rapid drying its insulation properties are restored. Flax doesn't actively combust and doesn't emit harmful substances into the environment during use. The breathing properties of a linen insulation allow it to create optimum indoor microclimates. Its heat-insulating properties are comparable with mineral wool: heat conductivity - 0,037 W / (m • K) that is an excellent indicator [6, 7].

A full evaluation of Linen would also compare its relative cost to the above findings.

Results of Calculations

For calculation of a carbon footprint of life cycle of insulation materials, processes were analyzed and models of production of insulators were created.

Diagrams 1-3 show models of production life cycles for insulation materials. The models do not extend to the production processes of raw materials, processing or subsequent utilization, manufacture of binding and packing materials. On schemes blocks and arrows depict material and power streams.

On blocks are specified:

• capital Latin letters – the country in which parameters the carbon footprint is measured, in our case – the Russian Federation ("RU");

• the name of the process, for example "Foaming";

• color-coded in the right top corner the branch to which this process belongs is designated;

• types of process:

• "u-so" - single process (single operation);

• "u-bb" - the number of the consecutive actions happening within one process (black box).

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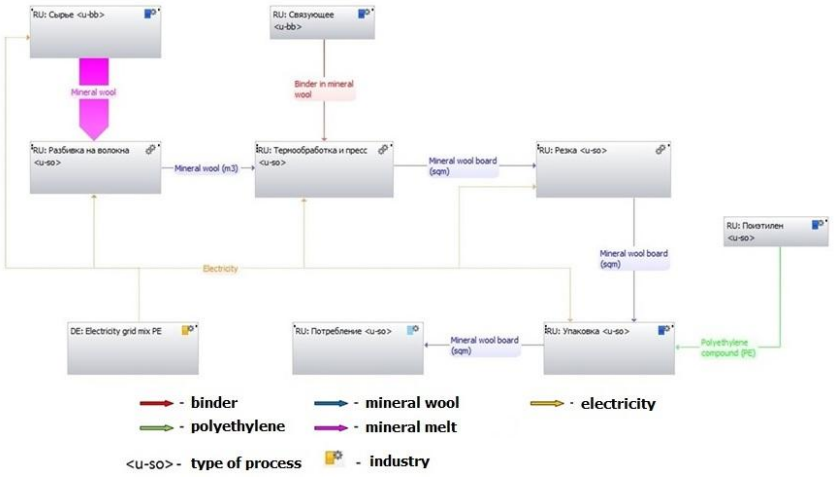
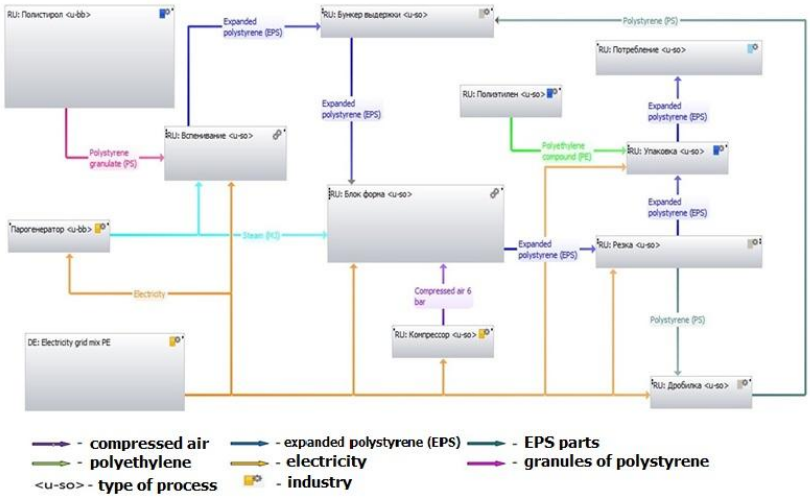
All blocks are connected by arrows showing the direction of the movement of streams of materials or energy. The thickness of the arrow indicates the amount of the material used in a stream. Units and descriptions are included.



Pic. 1. Model of life cycle of mineral wool production



Pic. 2. Model of life cycle of EPS production

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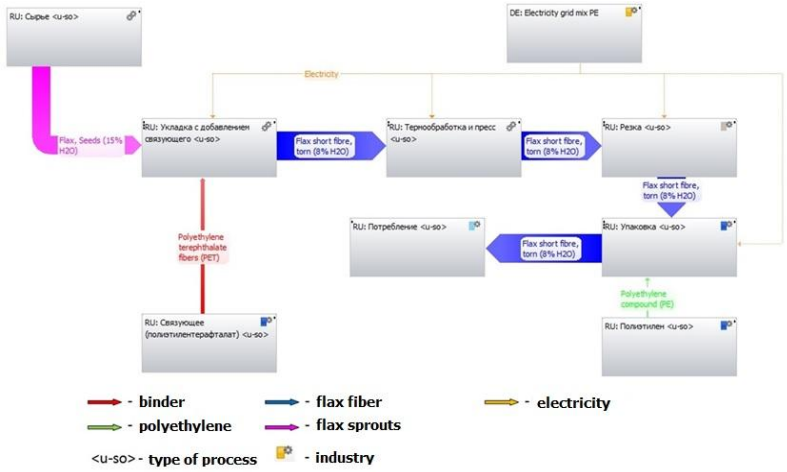

Pic. 3. Model of life cycle of flax insulation production

Thus, the developed models for 1 kg of this type of an insulator, basic for an assessment of a carbon footprint from production, and reflecting all of the main processes and streams. The results of calculation of a carbon footprint received during modeling were used in the comparative schedule

Results and conclusion

After modeling production systems we calculated overall carbon footprints using GaBi 6 software. These are shown below (tab. 1, fig. 5).

Table 1. Emissions of greenhouse gases from the life cycle of production of 1 kg of insulation material (CO2 equivalent)

Insulation	**Carbon footprint, kg. CO2 eq.**
Mineral Wool	206,3
Flax insulation	101,3
Expanded polystyrene	96,2

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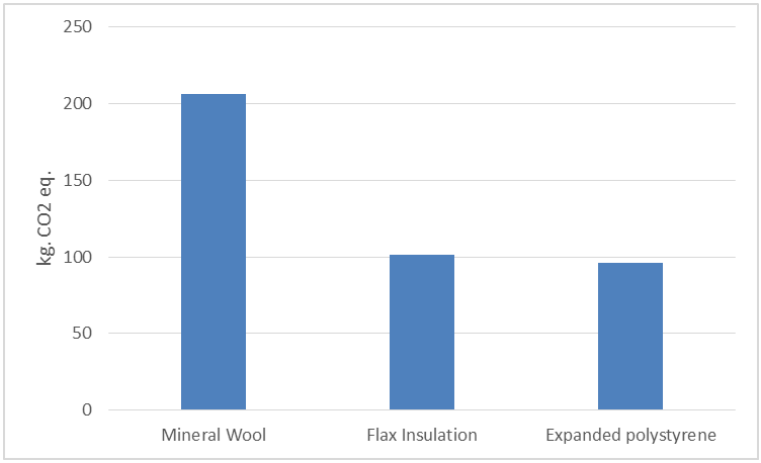

Pic. 5. Change of emissions of greenhouse gases from life cycle of production of 1 kg of insulation material CO2 equivalent)

Analysis shows that the maximum emission of greenhouse gases occur by production of mineral wool (tab. 1). Emissions of greenhouse gases from the production of expanded polystyrene and a linen insulator are approximately the same level, with slightly lower results for expanded polystyrene (tab. 1).

In conclusion Flax and Expanded polystyrene contain similar carbon footprints, approximately twice that of mineral wool. The limitations of this result is that it does not show the rest of the life cycle either prior to manufacturing of the components or in or after use. conclusions are largely subjective and not quantified at this stage. The relative costs of manufacture are not compared.

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LEGAL AND ECONOMIC FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

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REMEDIATION OF OIL-CONTAMINATED SOIL IN NIGERIA

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Abstract: This paper examines the environmental pollution and remediation of oil spillage in the (Niger delta) Nigeria, oil spillage is one of the greatest problems Nigeria is currently battling with especially in Niger delta region. Oil communities at have been at the receiving end of environmental problems, the problem has generated a lot of concern within three arms of government especially in the oil producing states. Bioremediation Among the different techniques to enhance natural degrading by indigenous microorganisms, seeding of new bacteria and fertilizing the indigenous populations have attracted the most interest. the application of nutrients as nitrogen and phosphorus in the form of fertilizers have shown to be most effective in accelerating the bioremediation process and at the same time to be environmental and economic beneficiary to the Nigeria soil.

Key words: remediation, oil spill, ecological and economic damages, in Nigeria

Introduction. The exploration and exploitation of crude oil resources spite of it overwhelming economic important been associate with environment degradation, in Nigeria, has evidently

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Oil spills and discharges of oil into water bodies - a very common type of environmental violations in Nigeria. This often leads to poisoning of the drinking water and the destruction of vegetation. According to independent estimates, during the 27 oil spills at Shell facilities from 1982 to 1992, the environment has got 1,626,000 gallons of oil. Of the total number of spills recorded at the facilities of Shell, a company operating in more than 100 countries, 40% were in Nigeria. Bioremediation is a process by which chemical substances are degraded by bacteria and other microorganisms. The technique has been found to have a potential for broad applications in terrestrial and freshwater environments for treating soils and sediments contaminated with oil and other substances, as well as for coastal environments impacted by oil spills.

The activities of foreign oil companies in Nigeria have led to large-scale consequences for all components of the environment and the population using these resources. It is necessary that the oil companies were guided by the principles of environmental responsibility

The regulatory framework in Nigeria for the prevention and oil spill response should be improved. To do this, it is advisable to use the experience of environmental standards in Russia and other countries.

We must also develop a regulatory framework to support the application of technology reclamation. As a basis you can use foreign experience in Europe, Russia and other countries.

This paper is emphasizing the need for federal government and the agencies to implement all measure and standards to tackle the ecological and environmental problems in the oil producing Niger delta region.

Thus, the main cause of accidents is corrosion. this may be due to poor quality pipes with the properties of the oil, which is transported by pipeline.

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Causes of pipeline accidents in (Niger delta) Nigeria

Major SOURCES OF OIL SPILLS	**Incident**
Corrosion of pipes	**80**
Mechanical impact during excavation	**26**
Construction and engineering	**20**
operational errors	**10**
Sabotage	**20**
Total Other factors	**15**
Total	**161**

Methods and research design

To address the environmental consequences of oil spills is necessary:

to assess the impact of oil pollution on the environment;

•assess the ecological and economic damage,

• select the optimum technology reclamation of land contaminated by oil spills during oil processing plant at the facilities in the Niger Delta region in Nigeria;

• Develop a scheme of environmental monitoring to prevent pollution of land oil and petroleum products, operational measures to address possible negative situations and follow-up for the restoration of the lands;

• propose a system of accounting documents of accidents and the accident.

Results of the research and discussion

Oil spillage has a major impact on the ecosystem into which it is released. Immense tracts of the mangrove forests, which are especially susceptible to oil (mainly because it is stored in the soil and re-released

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annually during inundations), have been destroyed An estimated 5 to 10% of Niger delta mangrove ecosystems have been wiped out either by settlement or oil. Or needs to create the necessary normative documents to evaluate the accidents and mitigation of their consequences,

The rainforest which previously occupied some 7,400 km² of land has disappeared as well. Spills in populated areas often spread out over a wide area, destroying crops and aquacultures through contamination of the groundwater and soils. The consumption of dissolved oxygen by bacteria feeding on the spilled hydrocarbons also contributes to the death of fish.

The most significant causes of environmental crisis - irregularities in the implementation of projects, as well as depreciation of equipment In particular, an accident during transportation of oil often occurs due to corrosion.

It is necessary to develop a regulatory framework to support the application of technology reclamation. As a basis you can use foreign experience (Europe, Russia, and others.).

For Nigeria, the high relevance of the use of biotechnology is characterized by land reclamation. In carrying out bioremediation is important to consider factors such as the availability of nutrients and the form in which they are found in the environment, the overall biological activity and sanitary condition of soil, the composition of soil cenoses and introduced during bioremediation organisms or their communities, carrying contaminants from living organisms and on the tropic food chains set of remediation techniques, processes, physical and chemical transformation of a biotic environmental factors lead to the elimination of the harmful effects of petroleum hydrocarbons, particularly in the surface soil layer.

Analysing the processes for remediation of contaminated land from oil products in Nigeria shows that even the cleaning of oil-polluted land does not lead her to a good natural state, because, firstly, in our time, there is considerable uncertainty in the estimates of the quality of work performed, which creates a

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problem of rationing residual oil content in the soils. Second operating requirements for the quality of reclaimed land is not normalized the condition of the very important characteristics of the recovered here biogeocenosis.

Summary

In this regard, it is necessary that the oil companies were guided by the principles of environmental responsibility, in particular - "there is always time to do it right." The main objective should be to improve the reliability and safety to prevent accidental pollution, including spills, contamination of soil oil and petroleum products - one of the complex and multifaceted problems of ecology and environmental protection. At present, it has successfully developed the technology for bioremediation of oil-contaminated areas. This solution is achieved by stimulating microbial cenoses by applying fertilizers, microorganisms that are able to more effectively dispose of the pollutants or by making a variety of biological products.

Conclusion. Having considered the proposed technology remediation of oil-contaminated land, we recommend using the method of bioremediation of oil, since it is well suited for the treatment of soils in Nigeria, given its specificity and cost effective, as it does not require the transaction isolation from soil cultivation and supported on a carrier oil assimilating cultures of microorganisms.

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ENVIRONMENTAL ASSESSMENT OF FIRE DANGER ON THE EXAMPLE OF THE MOSCOW REGION

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Abstract: Emergencies of natural character are widespread including forest fires. In this article there is an assessment of fire danger of Moscow region on the basis of monitoring forest condition. There are analysis of soil and vegetation maps, provided the territory drained peat lands by deciphering satellite images. A lot of criteria of fire hazard evaluation and recommendations for its reduction were done.

Key words: Surface fire, Crown fires, Peat fire, fire danger

The Goal: Environmental assessment of the fire danger the Moscow region. The relevance of this thesis is that today in the Moscow region large areas of dried peat bogs were recorded. In this regard, the risk of peat and forest fires increase. It has a negative impact on forest ecosystems and living organisms, including the human. Such fires lead to smog, which leads to

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deterioration of the general health status and gives rising to other negative effects.

Research methods: Literary and stock analysis; Interpretation of drained wetlands were Conducted on the base of satellite images Landsat.; ArcGIS 10.2.1 assessment program was used for making a fire hazard map.

Wildfire - natural spread of fire on forest land. There are several causes of forest fires, - natural and anthropogenic causes. There are three types of forest fires**:** Crown fires, Surface fires and peat.[1]

Pic.1 The map of depleted peatlands

Surface fires are spread on the soil cover; it can be characterized by lower tier burning vegetation: pine litter, fallen leaves, grass cover and moss cover.

Crown fires are characterized as forest cover, above-ground litter and burning treetops

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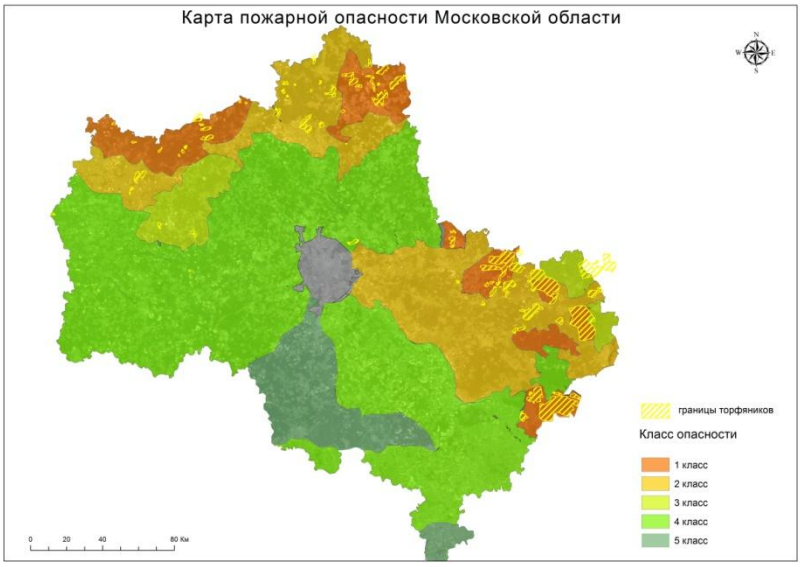
Peat fire is a type of forest fire. When it burns a layer of peat, as well as the adjacent roots of trees. Peat fire can go into the ground fire.[3]

For assessing of fire hazard in the Moscow region it was necessary to highlight areas with the greatest potential fire danger. For this purpose the deciphering of depleted peatlands was carried out in the research of the Moscow region.(pic.1)

There were given 5 classes of fire danger of the territory[4]: Class 1 – high fire risk; Class 2 – above average fire risk; Class 3 – average fire risk; Class 4 – below average fire risk; Class 5 – low fire risk



Pic.2 Map of fire danger in the Moscow region

According to the map the fire danger level is the highest in the Eastern and Northern parts of the territory. These areas are dominated by peat - and peat soils vegetation is spruce and pine forest types that meets the criteria for high danger class. The areas adjacent to areas with high fire danger, danger class are

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automatically increased. The first class of danger in the Moscow region include: in the eastern part - Shatursky Egoryevsky and Orekhogo- Zuevsky areas in the Northern part of Taldomsky , Lotoshinsky and Klin areas. Least flammable areas are marked in South West and South-East part of the region[2].

Recommendations

To reduce fire hazard areas with certain classes 1 and 2 risk should be monitored with the help of satellite images, and directly on site.

It is also necessary to make reclamation of disturbed lands. There are other ways to reduce fire dangerous and use of disturbed areas:

- The usage of generated territory under farmland.
- The usage of these lands for the construction of horticultural sites.

Conclusions

- The most dangerous of above the described species of fire is the peat fire.
- Spring and summer are the most flammable seasons
- Moscow region can be classified as an average and below average risk which corresponds to class 3 and 4.

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pozharnoi opasnosti v lesakh»[On approval of the classification of natural forest fire danger and classification of fire danger in forests]

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THE DYNAMICS OF FOREST COVER AT 'ELK ISLAND' NATIONAL PARK ABOUT MOSCOW RING ROAD

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Abstract: This study focuses on identifies the importance and nature of the effect on trees along highways to prevent the deterioration of the sanitary state of forests of National Park «Elk Island».

Key words: sanitary state of the forest, highway, automobile transport, air pollution

The automobile transportation is a major air pollution source in cities. Road network expands, increasing the quantity cars, and hence increasing pollutant emissions. Therefore it is important to identify the strength and nature of the impact of highway on the tree plants in general and on individual species.

'Elk Island' National Park is stand in Moscow Region, North-East off the city of Moscow. It occupies the South-Western part of Moscow Depression on the border of the southern slope of Klin-Dmitrov Hill chain and the north-western extremity of Meshchera lowland. It occupies Kliazma-Yauza-Pehorka watershed.

The relief of the territory has levelled quiet character and represented by erosion-accumulative plain. Moscow Ring Road (MKAD) runs on the Central Moraine Plain with sediments of sandy moraine of the Moscow and Dnieper times. This area is mostly covered with soddy gley soils.

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Vegetation features of the National Park are determined by its location on the border of the subzone of spruce and deciduous forests of the Klin-Dmitrov Hill chain and pine marshy area of the Meshchera lowland. The vegetation is closer to the natural one in the central part of the territory dominated by mixed spruce and birch and spruce and lime forests. In the eastern part of the park pine and spruce forests are concentrated. Birch forests occupy depressed moist habitats and the urban part of the park on the disintegrated spruce forests place.

Moscow Ring Road is one of the major highways in the European part of Russia, has ten lanes and crosses the territory of the 'Elk Island' National Park as a boundary of the north-west. MKAD has a complex effect on the national park forest cover.

First, it pollutes air with dust, nitrogen, sulfur and carbon oxides. Nowadays Spanish researchers suggest that the CO, NO_2 и NO_3 can fertilize the soil [1, p.174]. But it is not the case.

Second, it pollutes soils with heavy metals, chlorides and petrochemicals, afflicting trees growing close to the road [2, p.180, 3, p. 127].

Third, large linear structures, such as the Moscow Ring Road, have a significant impact on the hydrological regime of adjacent territories and change subsurface flow which causes water stagnation in the root zone of soil.

Violation of the hydrological regime is the major risk factor for the forest ecosystems [4, p.40], because relief of the park has small slopes and moraine is located not deep from the surface of the heavy loamy. Along the Moscow Ring Road submerges zone was founded [5, p.37].

The aim of this study is to make recommendations on the sustainable management of Moscow parks and forests. The study was conducted in the **'**Elk Island' National Park.

The method of observation on permanent sample plots (PSP) was chosen PSP of pine, spruce, larch, birch and linden growing at the distance of 50 and up to 2000 m of the highway.

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To understand the dynamics of the forest cover we used Forest inventory out every 5 years, in 1998, 2003, 2008 and 2013.

Tree examination puts trees in one of the categories:

1 − no signs of weakening;
2 − weakened;
3 − strongly weakened;
4 − shriveled;
5 − dead standing tree of this year;
6 − dead standing tree of last years.

The sanitary state was determined by means of the integral score according to standard methods using a set of visual signs as follows: crown density, crown color, detected branch necrosis, the quantity of necrosed and dieback branches.

Pineries

In pineries on 3 of 5 sample plots drastic deterioration of sanitary state is occurred, 1 point after the first 5 years of observation.

The other two PSPs also demonstrate deterioration, less drastic, of sanitary state according to the results of the second examination. Their condition remains roughly at the same level.

In 2013 an improvement it was registered in the 3rd PSP.

Biological resistans of pineries is reduced because of missing natural revegetation this species. Under canopy pine well reproduce another species: lime and maple on soils with thick humus horizon, spruce on less pinguid soils. We can predict in the long-term perspective, that degrading first pineries synfolium will change to growing lime, maple and birch [4, p.54].

Spruce

Major risk factor for spruce is sallow aquiclude, seasonal stagnation water. Therefore windfalls timber occur more often and reduce resistance to saprogenic microorganisms.

The number of weakened and strongly weakened trees in spruce forests also increases with time on all four PSP. In 2013, large areas of spruce massifs in the national park were severely damaged or completely killed especially the old ones due to mass

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prevalence of eight-dentated bark beetles. The spread of this pest touched spruce stands on the sample plots. On one of them spruce died completely, and on two of them, more than a half.

Young growths are represented mainly by lime and maple on the moraine plain around the Moscow Ring Road, spruce regeneration is virtually absent.

Larch

In the late 1950's there were experimental plantations of larch in the national park. The MKAD impact on the stand is being strong. The first examination (1998) showed that almost all trees had no signs of weakening, but five years later the number of trees on both PSP has been almost halved.

Birch

In birch forests of all PSP it have been seen a significant reduction in the number of trees with no signs of weakening after the first 5 years. And in PSP located closer to the MKAD this tendency is more pronounced. There was also a very high quantity of dead standing tree. During subsequent examination sanitary state remained practically the same.

Main factor weakening of birch is seasonal overwetting. This factor is particularly strong effect on PSP 4 and 6, since they are located in the topographic low.

Young growths are represented by lime, maple, rarer spruce and asp. Young birch is practically nonexistent, but it has natural cause. The birch is pioneer species and in forest canopy not regenerating.

Lime

Between 1998 and 2008 there is a gradual deterioration in sanitary state of lime forests. If at the first examination most limes had no signs of weakening, the next one showed increasing of weakened and strongly weakened trees. However, in 2013, three of four PSP showed marked improvement in sanitary state: limes with no signs of weakening again represent a large part of the tree stand.

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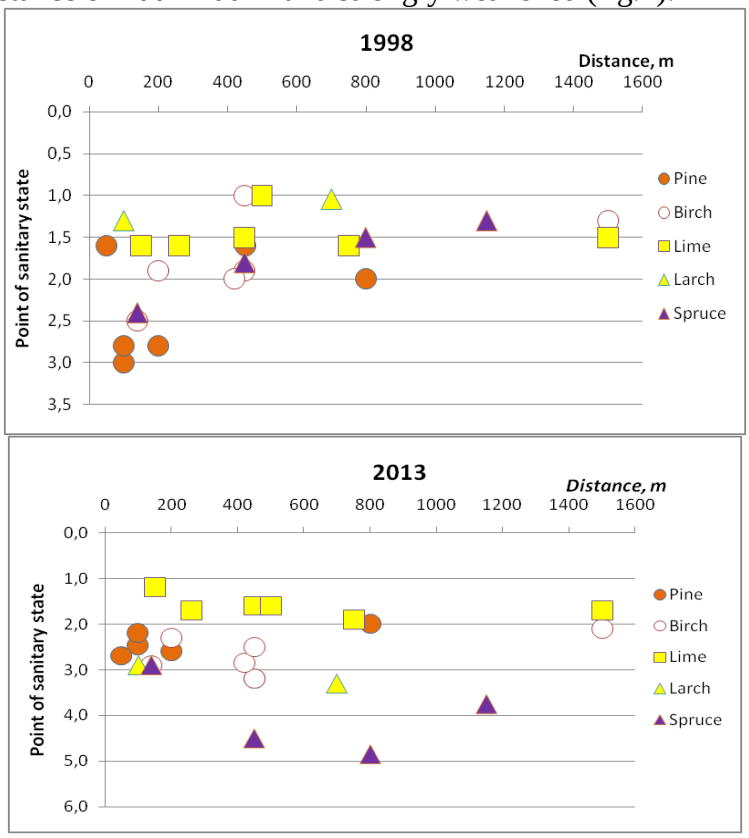
In recent decades, all species of lime most successfully regenerated. Lime forms second synfolium in half PSP.

For coniferous tendency to health improvement in tree stands is seen when they stand in a distance from MKAD, but for pine species it is not the same.

The sanitary state of the pines is practically independent on distance from the highway. For example, trees in PSP № 3 haven't signs of weakening (1.6 point) in 1998, although it is located 50 meters from the road. Three another PSP are located at a distance of 100 - 200 m and strongly weakened (fig.1).



Picture 1. The dependence of the sanitary state of tree stands dehending on distance from highway in 1998 and 2013.

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The deciduous trees are more resistant to auto pollution, especially limes. The sanitary state of lime almost unchanged. The state of birches is either also unchanged or gradually improve.

Timely recognition of these risk factors will prevent the deterioration of sanitary state of young forest stands.

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CASE STUDY: ENVIRONMENTAL AND ECONOMIC EVALUATION OF THE OIL INDUSTRY ACCIDENT RATE (ON THE EXAMPLE OF THE SAMOTLOR OIL FIELD)

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Abstract: This work dwells on environmental and economic evaluation of the accidents in the oil and gas industry on the example of JSC Samotlorneftegas.

Key words: oil and gas industry, economic evaluation, environmental assessment, oil spill accident, remediation, recultivation of oilfield.

The relevance of this study lies in is based on the fact that oil and gas production occupies holds a leading position among all industries on the degree in terms of adverse effects on the environment. The thesis analyzes and reveals the most potentially dangerous objects, which could can cause damage to the environment and the economy.

Samotlor field was discovered in 1965. The development started in April 1969. It is located in the Khanty-Mansi Autonomous District. The nearest producing fields are Montenegrin, Aganskoye, South Aganskoye, etc. During the development of oil fields, the negative impact is experienced by all components of the environment, but the lithosphere is affected the most, since great number of accidents is connected with relates to hydrocarbons spills on the surface of the earth.

As can be seen from the data, 89% of all pipes are metal,

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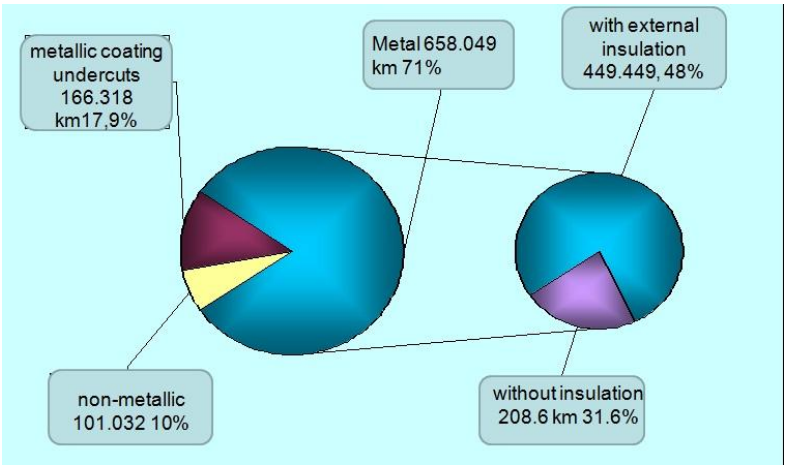
and only 11% - non-metal. From 1992 to 1997, most of the metal pipelines were built without external anti-corrosion insulation. For oil gathering collectors, share of such pipes is 31.6% (208,6km), which significantly increases the risk of accidents. The pipes without insulation should be replaced as soon as possible, in order to avoid accidents caused by external corrosion. Refer to Picture 1.



Picture 1.Distribution of pipelines on the qualitative composition

In analyzing the causes of accidents that occurred in the oil and gas wells, was revealed the following:

- 47% of accidents occur as a result of a combination of technical and organizational reasons,
- 36% of accidents occur due to technical reasons;
- 17% of accidents occur due to organizational reasons.

Among the technical reasons prevailed technology violation, among organizational reasons - technological and labor discipline violations, careless or unauthorized actions of the contractors. Analysis of the causes of accidents which involved open oil and gas fountains in recent years shows, that about 53% of accidents in the wells happens due to the lack of the preventive

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equipment on the mouth, or its unavailability, 15% - due to the lack / disability of check valves for the casing, more than 8% - because of wear or insufficient strength of casing.

Methods: The method of calculating damage from accidents at JSC "SNG" is *The methodology for calculating damage from accidents at JSC "SNG"* [1, 2].

Results and discussion: According to this method, all oilfield incidents that have occurred in 2012 were analyzed and calculated. The total amount of incidents happened in the oilfields in 2012 was 93, with the total damage of 9.1 mln rubles. it is necessary to justify the optimal system of reclamation from ecological and economical point of view [3].

Despite the fact that the concept of treatment of contaminated lands is correct and does not cause any doubt, as well as a positive trend in the quantitative field reclamation, its practical results in the majority are poor. Moreover, as a result of reclamation work on some sites that were subject to earlier oil pollution, the ecological state of the environment and soil properties gets even worse, and the recovery period after remediation increases. And this contradicts the fundamental principle of modern reclamation - "do no harm".

One of the most significant shortcomings in the field of remediation of contaminated lands, which causes considerable uncertainty in the quality of work performed estimation, is the issue of the valuation of the residual oil content in the soils. The absence of science-based and approved standards for permissible content of oil and its components in soil (MPC) allows the arbitrary, and often quite subjective valuation.

Conclusion:The greatest number of accidents on the fields is associated with spills of hydrocarbons on the surface of the earth. Calculation of ecological and economic damage caused by accidents of "SNG" showed a loss of 9.14 million rub in 2012. The annual increase of the disturbed land area, requiring reclamation, is about 10 ha. Reasons for growth are late return businesses land allocated for temporary use.

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The basic problems of the reclamation organization:

- Lack of a clear accounting and certification of oil-polluted lands in most enterprises.
- Most sites are given up and taken to the grave violations;
- Lack of Quality control of each step of the entire process and insufficiently regulated and regulatory law.
- Recommendations to improve the remediation work:
- Improvement of the legal and organizational support of recultivation process.
- Reorientation re-direction of recultivation process from quantitative to qualitative indicators.
- Creating conditions for the implementation in practice of more advanced from an environmental point of view, and science-based "benign" remediation technologies[4].

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LEGAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT IN TANZANIA

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Abstract: The aim of this research is to find and discuss appropriate legal for environmental management in Tanzania, as we know we need to take care of environment for the survival of human beings.

Key words: environmental regulations, Tanzania, strategies of cooperation and coordination

Introduction The complexity of environmental problems means that many sectors of the government and society are involved in actions to address them. The world has come to terms that Climate Change is real. The effects are there for us to see. A better understanding of climate change and its effects are clear, from un-predictable weather, unreliable rainfall, persistent droughts, frequent floods, variable temperatures amongst others.

In Tanzania, the Office of the Vice President is responsible for the Environment. This Office, using the Division of Environment, is responsible for the development of policy options, and coordination of the broad-based environmental programs and projects. It is also responsible for facilitating meaningful involvement of civil society in environmental activities.

In particular, the office is charged with the duties and responsibilities of environmental research, environmental policymaking, environmental planning, environmental monitoring, and environmental coordination of both national and international environmental issues.

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The strategic functions of the Office of the Vice President form the basis for the effective inter-ministerial cooperation and coordination, which, for example, has been underscored in the National Environment Policy and the National Environmental Action Plan (NEAP).

Decision-makers across government, business and communities will be able to use this new information to reduce climate-related risks.

Infrastructure can be redesigned to account for high temperatures and changes in the frequency and intensity of rainfall. Health, education and social support systems, finance for households and businesses and local planning decisions all have the potential to be 'climate-proofed' so they function well in future climate conditions [1].

This research is very important for the Tanzanian and African community in general, because law and agreement can brings into effect equitable access to sustainable development, and an equity reference framework. It needs to include rules that make it clear what parties need to do and, most importantly, ensure that emission reductions are sufficient in light of scientific knowledge.

The objectives of this research were to:

- Identify common legal and institutional framework for environmental management in Tanzania,
- Analyze some methodologies and to apply them in Tanzania,
- Review case studies/ experience in Tanzania concerning environmental issues.

Methods and Materials

The methods used in these report include reviews of published legal documents (policies, status and acts) under use in Tanzania.

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In addition, we made a review of other documents of international development agencies like World Bank, European Union and UNDP.

Moreover, some information obtained from the following sources:

- internet search;
- literature review;
- Questionnaire;
- Involved information from stakeholders;
- Two-government official from ministry of justice;
- Three academician from DSM University;
- One government officer from natural resource development.

Results

The legal aspects for environmental management in Tanzania are enshrined in the various legal documents forming the legal framework for enviromental management:

The constitution of the Republic of Tanzania 1977

Article 14 of constitution states that every citizens (Tanzanian) has the right to clean and healthy environment'

Article 245 state that parliament shall, by the law, provides for measure to intended a) to protect and preserve the environment from abuse, pollution and degradation; b) to manage the environment for sustainable development and c) to promote environment awareness.

In addition, Article 9 of the Constitution requires the Government to ensure that national resources are harnessed, preserved, and applied toward the common good.

Although this Article is part of the non-judicial "fundamental objective and directive principles of the state policy" provisions of the Constitution, it portrays the commitment of the Government to ensure sustainable development. It has two steps:

1) National environmental policy for Tanzania 1991

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One of the objectives is to integrate environmental concerns in all development policies, planning activities at national, district and local levels with full participation of majority in the community.

In addition, policy provide system of environmental impacts assessment and environmental monitoring, so that environmental impact can be eliminated and foreseen.

2) National environmental statute 2002

In Article 20 roles of developer, minister and legal agencies are given as well as Environmental Impacts assessments.

These regulations contains 8 parts among which are: Project beliefs; Environmental impact studies; Environmental impact statement; Review process of the environmental statement; Decision on EIS by Executive director; Access to EIS reports and other information.

Strategies, policies and plans

The National Environmental Policy provides a framework for making fundamental changes that are needed to bring environmental considerations into the mainstream of decision making in Tanzania. It also seeks to provide policy guidelines and plans and gives guidance to the determination of priority actions, for monitoring and regular review of policies, plans, and programs. It further provides for sectoral and cross-sectoral policy analysis thus exploiting synergies among sectors and interest groups.

The overall objectives of the National Environmental Policy are, therefore, to ensure sustainable and equitable use of resources without degrading the environment or risking health or safety; to prevent and control degradation of land, water, vegetation, and air which constitute the essential life support systems; to conserve and enhance natural and man-made heritage.

National environmental management Council-Tanzania [1].

The National Environment Management Council (NEMC) produces information and educational materials for stakeholders

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and target group. Among them a newsletter is produced twice in a year.

NEMC develops and or avails diverse awareness materials for enhancing public awareness on environmental related issues. These materials can be very useful to public at large in the course of environmental management. Some of these publications include the following: International treaties and The Kyoto protocol, The Montreal Protocol 1987.

International organization for standards**.**

International Organization for Standards (ISO) is a private sector non-governmental organization founded in Switzerland in 1947. It promotes international harmonization and development of manufacturing, product, and communications standards, Standards and guidance documents on environmental management, eco-labeling, auditing, life-cycle assessment, and environmental performance evaluation.

Calls for environmental policies, a commitment to environmental compliance and pollution prevention**.**

Tanzania has a number of other statutes sometimes referred to as environmental laws, but which are actually resource exploitation statutes: the Mining Act (1979), Fisheries Act (1974), Water Utilization and Control Act (1974), and the Forest Ordinance (1959). All these Acts are currently under review to reflect sustainable utilization of resources.

Conclusion**.** The challenge ahead is to incorporate the requisite institutional machinery and enforcement authority, including effective judicial procedures and compliance with international agreements into these laws, and to ensure their periodic review.

The government try to direct fiscal and economic policies to reflect environmental costs in the daily decision-making processes.

The Tanzania Natural Resources Information Centre (TANRIC) has the mandate to collect and manage natural resources and environmental data. It is a part of the Institute of

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Resource Assessment of the University of Dar es Salaam, from 1994. The Soil Survey, Land Research Centre of Canfield University in the United Kingdom are implementing the project. The University of Dar es Salaam collaborates with the Ministry of Tourism and Natural Resources.

Let's quote the UN documents: "*Tanzania, like many other developing countries, has a large amount of data on natural resources and environment. However, most of the data are scattered and exist in different formats. This makes it difficult to compare, extrapolate, or up-date information--a serious drawback for proper environmental planning and/or monitoring.*" [1].

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SEDIMENTS AND THE PROBLEM OF ASSESSING THE POLLUTION DEGREE

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Abstract: The increasing human pressure on water bodies makes it especially important to study the role of sediment in the process of self-purification and recycling of water pollution. The composition of the sediments affects the formation of the depths and the chemical composition of the water. They are a system that accumulates information about the history of the water body and the processes in the catchment areas. This property specifies their use as an indicator in assessing the state of water systems and pollution control. There are standards for MPC of pollutants in water and soil, however, the assessment of sediments is much more complicated. Existing standards assess of the sediment quality have a regional status and differ significantly. The lack of a single normative base does not ensure effective monitoring of the ecological state of sediments and makes it impossible to discover the most ecologically disadvantaged areas in reservoirs, adjust the composition and amount of monitoring to identify and neutralize the sources of pollution.

Key words: sediments, water pollution, normative base, heavy metals, pollutants, environment

The rapid development of all sectors of industry, energy, transport, population growth and urbanization have led to adverse environmental changes. Especially the pollution of the hydrosphere and all of its components (oceans, seas, rivers, ponds, swamps, underground waters) is progressing. In recent decades, the developed countries began to produce such a great number of various pollutants in the water, that the water treatment plants do not provide the necessary purification of drinking water. Present and especially the future of mankind largely depends on the quality of the aquatic environment. Availability of fresh clean

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water is a necessary condition for the existence of all living organisms on the planet. The share of fresh water suitable for consumption accounts for only 3% of the total quantity. [1, p. 3] Despite this, mankind mercilessly contaminates water. Thus, a very large volume of fresh water has now become completely unusable. The sharp deterioration in the quality of fresh water was the result of contamination of its chemical and radioactive substances, pesticides, synthetic fertilizers, sewage and it is a global environmental problem of our time.

The increasing human pressure on water bodies makes it especially important to study the role of sediment in the process of self-purification and recycling of water pollution.

The sediments are a complex multicomponent system and play a crucial role in the formation of hydrochemical regime of the water mass and ponds and watercourses ecosystem functioning.

Sediments are formed with the influence of combination of natural processes: climatic, hydrological, physical, chemical and biological, occurring both in the reservoir and its catchment area.

The composition of the sediments affects the formation of the depths and the chemical composition of the water. During the development of the reservoir the conditions of water environment undergo constant change, including changing the thickness and composition of sediments. If the water column is subjected to direct external influence, the sediments reflect the reaction of the water system for these effects. In addition, the mode of bottom sediments is associated with channel processes caused by natural and anthropogenic factors. In this regard, sediments condition monitoring is a necessary component of the water bodies monitoring.

The sediments are in constant exchange with the aqueous medium. Thus, they are a system that accumulates information about the history of the water body and the processes in the catchment areas. This property specifies their use as an indicator in assessing the state of water systems and pollution control.

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The composition of the bottom sediments is largely formed under the influence of anthropogenic load. A large amount of toxic substances of different nature such as heavy metals, organic compounds, petroleum products accumulate at the bottom of the water bodies. About 40% of oil trapped in the water body is deposited in the form of sediments that are very resistant to self-cleaning.These manmade sediments are concentrators bulk of contaminating water system materials that are not only soluble in water, but also partially inactivated interacting with each other (reactions of neutralization, complexation and others) or form a new compound, more toxic than the original. [2, p.314]

According to the WHO there are about 500 thousand chemical compounds and substances currently used in the industry, and more than 40 thousand of them are harmful to human health, and about 12 thousand are toxic. For example, in Russia almost 200 different pesticides are used, and there is no MPC adopted for the most of them. Many of the compounds falling into the environment are transformed into more toxic than the original (for example, by the chlorination of water in the water treatment process, during the bleaching of pulp and chlorine, etc.). Considering that MPS is adopted for approximately 1400 compounds in water, more than 1,300 in the air, and over 200 in the soil. The organization of eco-analytical monitoring of the environmental pollution by toxicants is very relevant for Russia. [3, p. 10]

Water pollution is mainly due to runoff pollutants and their deposition from the atmosphere. Getting into the water bodies, contaminants are comparatively rapidly redistributed between water and sediment.

Depending on processes inside the water body, sorption properties of sediments, watershed landscape features, as well as the properties of the substances released into the water bodies, sediments may be drives of chemicals and become a source of secondary pollution of the water body.

Sediments reduce the external impact on the water system

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participating in the process of self-purification of water by accumulating harmful substances in their thickness. Under certain conditions contamination of bottom soil can lead to secondary pollution. These processes, on the one hand, play a positive role predetermining self-purification of water masses, and on the other hand, they lead to a progressive intoxication of water biota. The increase in the level of toxins accumulation is the factor that brings environmental disasters and causes firstly impropriety of fish and fishery products for food and feed purposes, and then the mass death of fish from the cumulative toxicity. The reproductive function is also violated due to the accumulation of toxins in the gonads. It also may cause the destruction of the fish gene pool.

Sediments of the surface watercourses are traditionally used as an indicator to identify the composition, intensity and scale of man-made pollution. To a large extent it is due to the fact that channel deposits (an important component of hydroecosystems) are the final link in the local landscape compounds, whereby their composition reflects geochemical features of catchment areas.

Vividly such dependence is found in the river basins in urban areas, where most streams are the main receivers of sewage and industrial emissions, waste and melioration runoff from cultivated areas.

Sediments are more informative focus of research than water. This is so, because the chemical composition of the sediments (as opposed to an aqueous medium) carry information about the general condition of the ecosystem, both natural and man-made component of pollution for a long period of time. Accumulating heavy metals, radionuclides, toxic organic compounds, sediments on the one hand assist cleanse the water environment, however on the other hand, they are a constant source of secondary pollution of water bodies.

Most of the contaminants in the water ecosystem enters the bottom sediments, thereby primers often contain high concentrations of pollutants, while their concentration in the water may not be high. [5, p. 120] In addition, due to the high rate

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of toxicants accumulation the spectrum of detected components in the sediments is much broader, and therefore more informative than in water. That allows to track the dynamics of the large number of pollutants.

The need for detailed studies of material composition, geochemical characteristics and toxicological hazard of the sediments is determined by this fact. The increasing pace of human impact on aquatic ecosystems leads to significant accumulation of pollutants in the solid phase of aquatic ecosystems (in sediments and suspended matter).

In most cases man-made deposits become hubs bulk of pollutants and actively impact the channel process and determine the ecological status of river systems.

A significant part of toxicants is adsorbed by particulate matter with the influence of gravitational forces and settles on the bottom, then accumulates in sediments (particularly in the mud). After that they are included in bottom substances circuit or migrate into the deep layers of sediment and undergo diagenetic transformations there.

Identification of the basic laws of heavy metals migration in the system "catchment area - the aquatic environment - sediments" is quite a complex issue that requires a full-scale research, analysis of a large volume of observation and evaluation of the role of heavy metals migration through the food chain. Thus, studies of conversion of heavy metals in the system "the aquatic environment - sediments" and receiving quantitative estimates of the migration process intensity is a very urgent task. According to these characteristics the danger of secondary pollution of water bodies can be estimated. On the other hand, the relevance is determined by the fact that the problem of determining the landscape features of the sediment formation is still not solved.

It is essential to identify the role of sediments in water pollution during the process of formation of the water quality in freshwater ecosystem, especially in the secondary pollution. It

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attracts attention of researchers around the world. Due to the accumulation of various chemicals that show toxic effects on aquatic organisms, natural water and sediments acquire a new property of toxicity. From the environment that sustains life the water becomes corrosive, and poisonous for living organisms. Evaluation of the intensity and patterns of migration processes of pollutants in the "catchment area - the aquatic environment – sediments" system is a very urgent task.

Due to intensive anthropogenic impact on water bodies sediments have begun to play an increasingly significant role in processes inside water. They have ceased to be only a factor of improvement of water quality due to sedimentation and sorption of different pollutants (mostly man-made) from the water masses. The main inorganic elements that degrade the quality of water in the reservoirs, are considered to be toxic chemicals including toxic metal compounds, alkalis, salts. As a result of release of these substances into the water its composition changes, it becomes unfit for consumption by living organisms. The main source of pollution is the waste water of large enterprises, factories, mines. In recent years, sediments of water bodies in the most economically developed countries accumulate much more heavy metals, pesticides and other contaminants than in water. Concentrations of these components in sediments are much higher than in water.

Great attention is paid to the degree of sediments contamination with various chemicals, primarily heavy metals, petroleum products, pesticides. So the assessment of the sediments quality is reduced to determining the content of some toxic substances by chemical analysis, or evaluation of their toxicity with bioassay methods. Sorption of heavy metals by sediments depends on the nature of their composition and organic matter content. In particular, 5-10% of lead in sediments is associated with organic substances, especially with humic acids. [4, p. 24] At the same time the transformation of inorganic lead to organic is a serious threat to the biota. The intensity of the

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mercury sorption insediments also depends on the content of organic compounds. Forms of occurrence of mercury in water and their distribution depend on pH of water. In aqueous systems the mercury forms a large number of complex compounds with organic ligands which are then adsorbed on particulate matter and accumulate in sediments. Both inorganic and organic mercury compounds are highly soluble. The river waters mercury migrates mainly in the suspended state, the proportion of suspended forms in the river waters is 83-96%, in the lake is 10-13%, and in the sea is 60-96%. [2, p. 106] It should be noted that in the end the heavy metals are concentrated in aquatic ecosystems in bottom sediments and biota, whereas they remain in relatively small concentrations in the water. Thus, when the mercury concentration in sediments is 80-800 mg/kg, its water content does not exceed 0,1-3,6 mg/l.[2, p. 107]

Observations on the content of pollutants in the sediments are part of the system for surface waters monitoring. A recent study analyzed the particle size distribution and chemical composition of samples of bottom sediments of the Moscow river basin in its middle reaches. Gross form of the following indicators of the chemical composition were determined in the samples: copper, zinc, nickel, cobalt, cadmium, lead, chromium total iron, phenols, formaldehyde, manganese (in total), mineral oil, anionic surfactants, pH.

The content of heavy metals in the sediments has been very varied, but in most cases low. Among all the identified heavy metals in selected samples of bottom sediments the concentration of cadmium varied and ranged from 0,2 mg/kg in sediments of the river Chechera to 1.7 mg/kg in the river Moscow.

The cobalt content of sediments was also varied, but somewhat higher than cadmium and ranged from 0,2 mg/kg to 6,5 mg/kg, but in most water bodies it does not exceed 2,0 mg/kg. The content of nickel and lead in the sediments of investigated rivers was at the level of chromium. The lead content in the majority of watercourses was 0,5-5,0 mg/kg. The maximum

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content of lead was observed in the sediments of the river Vyunka (20,0 mg/kg).

The average copper content in sediments of the investigated watercourses was at 10-15 mg/kg, but in sediments of the river Malinovka it reached 200 mg/kg.

The concentration of zinc in the sediments of streams can be considered elevated in comparison with other metals listed above. The amount of zinc in most watercourses was about 10-20 mg/kg, but in sediments of the river Moscow it was 80-85 mg/kg.

The content of manganese in all the studied streams can be called high. Its concentration ranged from 50 mg/kg to 400 mg/kg, and the maximum was found in the river Chechera (980mg/kg).

The highest content of all submitted metals in the sediments of the investigated watercourses was iron which concentration in almost all watercourses were 1700 mg/kg - 2000 mg/kg. In sediments of the river Moscow it reached 4000 mg/kg.

Among the pollutants the content of phenols in the sediments was not high and in most of the objects it was 0,4-0,8 mg/ kg. The lowest concentration in the sediments of watercourses was the content of detergents, it did not exceed 0,15 mg/kg.

The formaldehyde content in the bottom sediments of the watercourses was very diverse and was 5-10 mg/kg, but in the rivers Makedonka and Chechera it reached 30 mg/kg.

Very significant and diverse of all the pollutants was petroleum contamination of sediments. The maximum oil content was in the sediments of the rivers Malinovka, Viunka, Petritsa (8-9 mg/kg). The content of oil in the sediments of the river Moscow do not seem high in comparison with the above, and did not exceed 3,5 mg/kg. [6]

The ecological status of the aquatic ecosystem is estimated by the degree of pollution of its water component and the level of accumulation of toxic substances in the sediments. Their research is of great importance in determining the degree of anthropogenic

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pollution of rivers and assessing their original state necessary for future ecological and geochemical monitoring. At the same time, the number of papers devoted to a comprehensive assessment of sediments is extremely small.

It should be noted that it is difficult to evaluate the results of measurements. The lack of a clear solution to the question of the role of sediments in the process of self-purification and the MPC of pollutants in the water bodyis due to insufficient development of the common approaches to the analysis of sediment samples. There is no interpretation of the results based on particle size distribution of sediments approaches to rationing of sediments quality. In our country there is a commonly exepted system of state environmental monitoring, introduced by the Federal Law № 331 (2011), but it is unlikely to be effective in the absence of standards for polluting substances content in the sediments as the protection of pollutants deposit and the most dangerous component of the aquatic ecosystem. [7] There are standards for MPC of pollutants in water and soil, however, the assessment of sediments is much more complicated. Thus the assesment of sediments quality was carried out by using any appropriate criteria for water or MPC pollutants in the soil. To assess sediments according to the standards developed for the soil is not quite correct, because sediments are not soil and differ from it in terms of formation, accumulation and migration of pollutants, they are subject to completely different requirements and regulations.

In the Russian Federation the control of bottom sediments of water systems is provided in accordance with the law "On the Environmental Protection" (2002), the Law "On fishing and preservation of aquatic biological resources" (2004), the Water Code (2006). It is included in the monitoring system of the environment. [8, 9, 10] However, there is no single document with norms for pollutant content. Existing standards assess of the sediment quality have a regional status and differ significantly.

The lack of a single normative base does not ensure

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effective monitoring of the ecological state of sediments and makes it impossible to discover the most ecologically disadvantaged areas in reservoirs, adjust the composition and amount of monitoring to identify and neutralize the sources of pollution.

To create an effective state system of monitoring of bottom sediments it is necessary to develop regulatory requirements, which prerequisite should be a single standardized basis.

A great amount of hydrobiological observations, their comprehensiveness, comparability, harmonization and standardization, centralization of all hydrobiological information have special requirements for methods of hydrobiological analysis of surface water and sediments. These methods should be available for hydrobiologists who do not have high professional qualifications, complex technical and material support. However, they must ensure adequate assessment of water quality and sediment, giving highly reproducible results, ensure rapid receipt of reliable information, have sufficient resolution to detect even temporary minor violations of individual biological processes as well as the general status of aquatic ecosystems, have highly effective working conditions of the general observation network, including remote areas. At the same time hydro-biological methods of analysis should provide long-term storage of hydrobiological information as the basis for forecasts of changes of aquatic ecosystems caused by nature and anthropogenic activities.

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EVALUATION OF COMPLEX ANTHROPOGENIC IMPACT ON THE HEALTH OF THE POPULATION OF SAMARA

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Abstract: To analyze the sanitary situation in the various regions of Samara and ranking the city largest anthropogenic integrated burden on the health of the population, we calculated integrated indicators of chemical contamination of air, water and soil and evaluation of the health status of the population by districts of the city . It was found that the degree of stress sanitary situation in almost all districts of Samara is characterized as relatively satisfactory.

Key words: ranking of the city, anthropogenic load, morbidity

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The article is devoted to the very topical issue of adverse human health effects in Samara. The topic under consideration, of course, is of interest from an environmental, legal and social point of view as the greatest anthropogenic influence exposed areas of industrial development and areas with a high density of population residence, to which the Samara region, and especially the city of Samara.

In recent years, a large amount of research devoted to the study of the complex influence of environmental factors on human health, but remain poorly understood regional aspects, namely indicators of environmental pollution on the municipal areas of Samara and their impact on public health. This determines the feasibility of a study aimed at understanding the extent of pollution and the incidence of the population in some areas.

The aim of the work is to analyze the sanitary situation in the various regions of Samara and the city rankings largest integrated antropogenic load on human health.

The work is done on the basis of research Institute of hygiene and human ecology. Human ecology and environmental hygiene under the program "analysis of the environment and demographic and health situation for epidemiological modelling of the formation of ecologically dependent disorders" and was used by the following documentation:

- The statistical data on population of districts of Samara in 2004-2013, presented by the Samara regional Committee of state statistics in the "statistical Yearbook of Samara"
- Annual reports of medical institutions of the Department of health administration of Samara for 2004-2013, form No. 7 and 12 (the head - V. V. Goryachev);
- Protocols of water and soil, performed by the Department of hygiene and epidemiology in Samara the Federal budgetary healthcare institution "Center of hygiene and epidemiology in Samara region"
- The statistical data about air quality in the city of Samara with 13 fixed-route (under torchlight) posts (2004-2008), submitted to

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the Federal budgetary healthcare institution "Center of hygiene and epidemiology in the Samara region";
- The statistical data about air quality in the city of Samara with 18 monitoring stations (2009 - 2013) submitted Volga Department of Hydrometeorology and environmental monitoring.

For the calculation of integrated indicators of chemical pollution, determination anthropogenic impact and ranking the city used Guidelines "comprehensive definition anthropogenic load on water bodies, soil, atmospheric air in the areas of residential development."
The state of the habitat of the administrative districts of Samara was estimated as of air pollution, quality of drinking water and soil.

The analysis of the qualitative and quantitative evaluation of hygienic air pollution indexes 9 5300 in the amount of research on each observation post. The volume of total emissions of polluting distributed in nine administrative districts of Samara uneven. If the central areas of the city (Oktyabrsky, Samarsky, Leninsky and, to a lesser extent, Jeleznodorojnii) determining factor of air pollution are emissions from vehicles, for the industry, the Kirovsky, and Sovietsky industrial enterprises Krasnoglinskoye areas contribute to the pollution of the air environment is more significant. The leading air pollutants administrative Samara is formaldehyde. Thus, the sanitary condition of the air environment of the poor districts of the city, although the content of the substances does not exceed the MPC. The highest rate of air pollution identified in the Leninsky district. The lowest in the Sovietsky administrative district.

The analysis of the results of studies 556 samples of tap water for 14 indicators (completed 7784 study). The quality of drinking water supplied to the population of administrative districts of Samara centralized water supply systems for the sanitary-chemical indicators meet hygienic requirements, but should pay attention to the improvement of the water treatment system in the Kuibyshev and Krasnoglinsky areas where water is

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used as a source of underground water with high iron content . In these areas, water pollution index of the highest.

The analysis of the research results of 180 soil samples in 6 indicators (research carried out in 1080). Samara for a number of decades has been a major industrial center with different types of industries that are sources of heavy metals entering into the environment in general and the soil in particular. Thus, the sanitary - hygienic characteristics of the soil on the territory of the administrative districts of Samara unfavorable. The soils are alkaline, rich in metals and oil products. Only two Krasnoglinskaya and Samarsky areas throughout the observation period, the oil content was lower MACs.

The most contaminated, which is confirmed by statistical methods research is the soil of the Industrial District, the content of copper and cadmium in comparison with other areas.

Soils contaminated with parts of the sanitary - indicative microflora, small codes that do not show the well-being, and the inhibiting effects of chemical pollution. An exception is the soil of the Kuibyshev region, where bacterial contamination was within standards.

The study identified areas of Samara with different levels of exposure to environmental risk factors. The greatest value of the complex antropotehnogennoy load characteristic of the Leninsky, Kuibyshev and Industrial areas of the city. At the same time Leninsky and Kuibyshev district have been identified as the most disadvantaged by high rates of air pollution and industrial - soil. Also highlighted areas with the lowest level of anthropogenic load: Jeleznodorojnii and the Sovietsky.

Assessment of stress sanitation situation due antropo man-made environmental pollution in Samara was made based on the results of hygienic ranking. At the same time, along with a comprehensive indicator of the load into account antropotehnogennoy indicator of climatic conditions (topography, mesoclimate, the intensity of the natural processes of self), ranked by 3-point system, as well as health indicators of

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morbidity neoplasms, diseases of the circulatory system and respiratory system. Since throughout the city climate conditions correspond to the value "favorable", the values of the index for all areas taken per unit.

Thus, virtually all the administrative districts of Samara degree of tension sanitary situation is characterized by a relatively satisfactory only exception is the Leninsky district, where there is poor sanitation situation, and the degree of ecological trouble described as tense.

To reduce antropogenic impacts in the area of the city should:

1. Optimize the movement of vehicles by:
- Construction of a new central line;
- Increasing the capacity of existing highways;
- Improving coating roads;
- Improving the quality of petrol;

2. Develop a set of measures to improve the ecological and hygienic condition of the soil administrative districts of Samara
- Seamlessing garbage collection;
- Paving areas garbage collection;
- The elimination of any unauthorized dumps;
- Maintaining the optimal condition of the lawn;
- The creation of new green areas;
- Introducing restrictions on parking of vehicles.

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POSSIBILITIES OF INTRODUCTION OF INTERNATIONAL ENVIRONMENTAL STANDARDS AT THE PERFUME-COSMETIC MANUFACTURES

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Abstract: Introduction of international standards on perfume-cosmetic manufactures plays an important role in producing high quality products without threatening the environment**.** Certified ecologically friendly manufacture allows achieving more attractiveness to the manufacture itself and the product. These kinds of manufactures require less financial investments to reach the ISO 14000 and it will receive more benefits than losses.

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Key words: ISO 14000, perfume-cosmetic manufacture, eco-labeling, ecologically friendly products.

Compliance with ISO 14000 is a direct proof of the fact that the company is not only concerned about the damage caused to the environment, and manufacturing of environmentally friendly products, but also is focused on the rational use of natural resources. In the European Union such compliance with environmental regulations is a requirement for a well-functioning industrial enterprise. More 500 EU environmental Directives, Regulations and Decisions constitute the body of the legal base of all industrial activities [1].

Russian perfume-cosmetic manufactures realize that is being more and more important to meet environmental standards for beauty products manufacturing, so they make environmental issues an essential goal of their activity. More precisely, the law departments have to ensure compliance with international standards of environmental protection.

The Environmental Impact Assessment (EIA) Directive 85/337/EEC, in force since 1985 and amended in 1997, 2003 and in 2009, is still widening the scope. It increases the types of projects requiring mandatory environmental impact assessment. It provides new screening criteria and establishes the list of required data. The basis of the Directive is the principle of "prevention", the meaning that measures to protect the environment should be taken in advance to prevent their occurrence in the future [2, p. 17]. Therefore, any economical project must have an appropriate environmental assessment.

Cosmetic legislation in Russia does not require environmental labeling of products. And to make it demands a lot of time, expert work, extra charges to be added to manufacturing costs, and finally, resource-cost vs user-value is to be discussed. Cost accounting with total expenses allocation can be heavy for a small enterprise. Still one hopes that such a label would enhance

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the attractiveness of products for the consumer. This point is the incentive for receiving environmental certification.

The implementation of Council of the European Communities Regulation (EEC) No. 880/92 on an eco-label award has had a difficult way in Europe: it was adopted in 1992, upon a current German one of 1991. First, it was just an added Plus for customers to prove the quality. After more than 20 years, an "eco-daisy" stamp of approval seems to become “the must” and predict an increase in eco-label producers soon. It dealt first with "environmentally-friendly" packaging: it was an award in the proper meaning of the word. It is still being too costly to be effective, yet... The client is the king. Will it be an attraction for a Russian client? Is the Russian client concerned with the environmental issue well enough? An assessment is to be done. Or rather Russian manufactures think that this label is a way to sell their production in European countries? It is quite another task. And another assessment is to be done. The only condition to make this label substantially impact development of eco-friendly merchandise is the quantity of manufacturers participating in the program. The producers must see a market advantage in joining it, in showing the relationship of environmental certification to the pollution control [3, p. 16].

The products can be labeled with «green dot» (German: Der Grüne Punkt, Fig. 1.), created in 1999 [4] and meaning that the packaging materials of consumer goods is recycled and the manufacturer of the product contributes to the cost of recovery and recycling. [3, 18 c.].

The packaging of perfume-cosmetic products can be marked "Not Tested on Animals" or Animal friendly [5]. This symbol indicates that the perfume-cosmetic products were not tested on animals during the manufacture and do not contain ingredients of animal origin.

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However, Russian companies are not that much focused on the introduction of environmental standards on manufactures. It is the case of perfume-cosmetic producers. The compliance to ISO 14000 is not obligatory but voluntary. They are mainly focused on the compliance of their product to Russian quality management standards, technical regulations and sanitary-epidemic norms in manufacture [6]. In the studied cosmetic industry it is theNSS [7].

Manufacturers of perfume-cosmetic products do not see a direct economic gain from obtaining a certificate of compliance and introduction of the ISO 14000 environmental management system. No doubt that the compliance with these requirements is the most important for the Russian market because consumers are less certain in Russian local products quality. We think, on the contrary, that this is the great reason to achieve compliance of local cosmetics to international standards on safety and quality. To explain it to chiefs of the industry is of a top priority.

Environmental management should provide analysis and selection of economically acceptable realization of its objective function, the cost-effective production, carying for the environmental performance of the manufacture [8]. Manufactures of perfume-cosmetic products are not "dirty" in terms of produced emissions. Basically, emissions contain minimal concentrations of chemical elements that are disposed of through the sewer system (however, there are elements which require more thorough recycling, such as oils, anti-bacterial agents, preservatives). For this reason, the introduction of environmental management system does not require large investments in terms of the integration of new links to ensure the reduction of emissions at the final stage. For example, to reduce the amount of substances discharged into the sewage system, the manufacturing cycle can be completed with stage of waste disposal with equipment for adsorption and flocculation.

EMS implementation also involves the use of environmentally safe components, and emitting use of

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preservatives, pesticides, antioxidants, antibiotics and others in the manufacture. Substances that are harmful not only the environment when waste disposing, but also is harmful and cause allergic reactions directly to consumers of products. Manufacturing products without preservatives and parabens, which increases the expiration terms of products, will cause a lot of questions from the distributors because of the increased risk of faster expiration of products.

Therefore, to minimize risks for consumers, the production will have to cut the production amount.

One of the demotivating points is an increase of the final cost. It is a widespread practice to put higher prices for eco-friendly products [8, p. 34]. Consumers understand that producing eco-friendly products requires natural raw material, so they would rather buy more expensive healthy and safe products.

Certification as a way of introducing environmental management is typical for Russia. The introduction of environmental management in perfume-cosmetic manufactures must contribute to the solution of economic and environmental problems which provides eco-sustainable state of the manufacture. However, the worldwide certification process for environmental management systems, government support and international confidence in environmental management of manufacturers support this trend. Moreover, conformity with environmental production standards allows businesses to get tax innovation wavers, tax allowances for anti-pollution investments, as well as credit, insurance and other benefits [8, p. 40].

Perfume and cosmetic manufactures have mostly passive environmental management focused on compliance with the basic requirements and regulations [6, p. 97]:

1. Cleaning at the end of the production cycle
2. Reducing pollution
3. Environmental reporting

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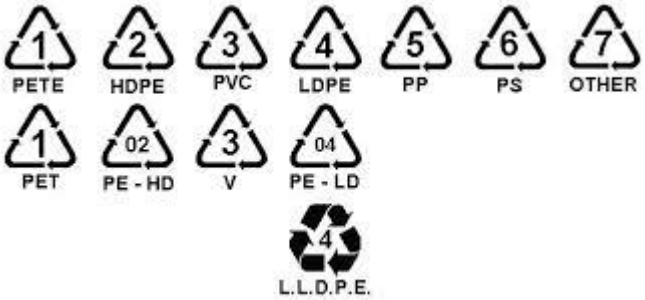
The use of secondary resources at cosmetic-perfumes manufactures is not developed, because of the nature of cosmetics and oral hygiene products.

The government should stimulate producers to make steps for compliance with the world environmental policy. Resource-saving energy consumption, environmental marketing ethics policy, the use of more efficient tools, in all operations at international levels, must be supported by the use of environmental certification programs. Government and certification authorities stimulate the introduction of a label of conformity with technical regulations of the Customs Union "About the package safety": the manufacturer is obliged to indicate all types of packaging (bottles, cardboard packaging) with Mobius loop.

This universal recycling symbolic label includes indications about the recyclability of the package, numbers corresponding to its material.



Indeed, environmental management is impossible without the involvement of certain funds needed for additional education of the staff, development of additional documentation.

Instead of creating new departments in the company and, consequently, new jobs it is highly recommended to increase the responsibility and awareness of the existing staff and individual stimulation maintain a high environmental quality [10, p. 151].

As it was said before, the other goal is to find a way to international markets which, of course, requires eco-standards as

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the main criteria [8, p. 37]: assessing the environmental life cycle, being focused on the environmental impacts of the product in all stages of its production, as well as decision-making in boundaries of strategic marketing for new product promotion.

In conclusion, practical bases of cosmetic manufacture in the field of environmental management is to prevent impact on the environment savings raw materials and energy resources including losses during storage, transportation, unaccounted losses, etc.

With introduction of environmental management system a perfume-cosmetic manufacture get more benefits than financial losses.

Ecological labeling on final product increases its attractiveness to consumers. The task of the government policy in the field of saving environment is to introduce international ecological standards, to stimulate manufacturers to obtain the ISO 14000 certificate. Manufactures with ISO 9000 have to make less involvements to adapt to ISO 14000 certificate. Successful integrating of ecological standards most of all depend on leaders ecological orientation.

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ECOLOGICAL EDUCATION AND TRAINING IN ACTION

Giuliodori Lucio

THE BEAUTY OF EARTH, THE BEAUTY OF SOUL: NIKOLAJ ROERICH AND THE PERENNIAL WISDOM

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Abstract: The work and life of Nikolaj Roerich coincide with a sort of celebration of the planet, to which he was intimately connected. What emerges from the work of this great master is the interdependence of life and art, beauty and the sacred, the inner and outer worlds, travel and arrival, peace achieved and perennial search.
These elements come together in a unity that shines with its own colors. The intent of my paper is to show how Roerich's artistic and earthly journey paints a kind of perennial and sacred beauty based upon a perennial and syncretistic wisdom.

Keywords: Roercih, painting, spirituality, syncretism, earth, nature, landascape, Tibet, Mountains, colors, Perennial Philosophy.

Mircea Eliade writes: «The conscience of a real and meaningful world is intimately linked to the discovery of the sacred. Through the experience of the sacred, the human spirit has grasped the difference between what is revealed real, powerful, rich and meaningful, and what is lacking in these qualities: the chaotic and dangerous flux of things, their fortuitous appearances and disappearances with its empty of meaning».
Nikolai Roerich's artistic and existential intent was right in line with this Elidian thought: discover the sacred, see it, see it in the reality of things, finding it as the meaning of them and at the same time as their beauty.

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The reality seen and painted by Roerich, was a reality imprinted in sacredness, a sacredness full of meaning, a transcendent and metaphysical meaning. The latter turns to imply the concept of beauty too.

My intention is to frame the Roerich phenomenon from these two distinct perspectives: the discovery of reality as sacred and therefore full of significance and the realization of his overwhelming and intrinsic aesthetic value.

First we must understand which meanings he grasped in the reality. It should be considered that he was fascinated by Eastern philosophical doctrines, his frequent trips to the East shows it clearly, in his paintings the East is a key issue, especially the snowy peaks of Tibet. Roerich also was deeply fascinated by Helena Blavatsky who in turn was attracted by the East. What are then these influences concretely?

Substantially Roerich, caught and painted a deep harmony between Humankind and the Creation; they are not separate but together, it is a single consciousness: the real is an extension of ourselves, the outer world is nothing more than the mirror of the inner one- Schopenhauer as well, who was also very influenced by Indian philosophy stated *die Welt ist meine Vorstellung*, the world is my representation.

Roerich, just like Gurdjieff – to mention another syncretistic Russian Master travelling along the East - wandered far and wide across the globe in search of the truth, in this sense we could call him a philosopher, in the old sense of the term, as a lover of truth. He traveled seeking truth and traveled to propose it, to spread it, to share it, as the center *Corona Mundi* created in New York just proves it.

The very fact of traveling, assumes in Roerich two specific meanings, the first coincides with the love for the planet, the indissoluble link with it, as they were one thing; the second implies a peculiar attitude towards the truth, typically syncretistic.

Roerich is one of those characters very closed to the so-called *Philosophia Perennis*, namely that specific philosophy that

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sees in every religion, in every spirituality, in every philosophy, a spark of truth. The Perennial Philosophy, whose the syncretism is its ontological matrix, treasures from different and distant historical and geographical contexts, the *corpus* that forms its own significance, a significance based on certain assumptions common to different *Weltanschauungen* developed throughout history.

Substantially, these assumptions are summarized in the interconnection of the physical and metaphysical reality, in quantum terms in their *entanglement* - quantum physics repeats, in scientific terms, some of the assumptions of the perennial philosophy.

The fundamental consequence of a concept of such far-reaching is that the man is no longer in conflict with reality as outer reality is not «outer» anymore: man and the planet are two manifestations of a higher and metaphysical reality, as two waves of the same sea.

This involves a totally harmonious relationship of man with the surrounding matter: the world is not seen as something to be exploited, to use and abuse to man's advantage. Man, according to the perennialist perspective, fully approved by Roerich, has not a violent attitude toward the planet rather a loving, peaceful, harmonious one. Think of the countless images of the Masters in meditation in the colored mountains painted by Russian artist. These men are in harmony with the Creation, a Creation of fantastic, fabulous, wonderful colors, as wonderful is the discovery of such a harmony.

The World seen from this mind set is a more beautiful world, as we never were used to see it. Roerich's colors seem brighter than the real, but in reality it's us who actually are are too dull.

Once such a deep harmony is reached, the intrinsic aesthetic value to the real emerges.

In conclusion, Roerich's painting should be framed in a perspective that is both metaphysical and aesthetic, the same

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perspective with which he lived his existence: his life was a spiritual journey in the name of an intellectual freedom, it was a perennial and fascinating search, in order to discover the sacred and its aesthetic and metaphysical value.
In a letter he wrote: «Give art to people, as it belongs to them. Not only museums must be embellished but theaters, schools, libraries, station buildings, and hospitals too; prisons must be beautiful as well, then there will be no prisons anymore».

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САМООЦЕНКА КАК ИНДИКАТОР ПСИХИЧЕСКОГО ЗДОРОВЬЯ ЛИЧНОСТИ

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Аннотация: Определяется актуальность исследования самооценки личности как индикатора психического здоровья. Обозначается ряд подходов к рассмотрению психического здоровья.

Ключевые слова: самооценка, самоактуализация, психическое здоровье, гуманистическая психология.

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SELF-ESTEEM AS AN INDICATOR OF THE PERSON'S MENTAL HEALTH

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Abstract: The relevance of research of the person's self-esteem as an indicator of mental health is defined. A number of approaches for the mental health analysis are represented.

Key words: self-esteem, self-actualization, mental health, humanistic psychology.

Психическое здоровье – одна из наиболее остро обсуждаемых проблем в психологии. Психическим здоровьем интересовались философы и психологи различных школ и направлений – Цицерон, Эпикур, З.Фрейд, А. Адлер, К.Г. Юнг, А. Маслоу, В. Франкл и др. Отечественные психологи также рассматривали отдельные аспекты душевного комфорта человека (С.Л. Рубинштейн, Б.Г. Ананьев, В.Н. Мясищев, Б.С. Братусь, А.Е. Личко и др.).

Однако, несмотря на многочисленные исследования в этой области, статус психического здоровья на сегодняшний день неоднозначен. Категорию «психическое здоровье» осмысливают и анализируют по-разному. Это даёт новые возможности исследования психического здоровья человека.

При определении понятия «психическое здоровье» существуют разночтения. Так, в словаре практического психолога [12, с. 175] психическое здоровье определяется как состояние душевного благополучия, характерное отсутствием болезненных психических проявлений и обеспечивающее адекватную условиям действительности

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регуляцию поведения и деятельности. В этом позитивном смысле психическое здоровье является основой благополучия и эффективного функционирования для человека и для сообщества.

Некоторые авторы определяют психическое здоровье как идеальное понятие, основанное на творческих принципах свободы, духовности, индивидуальности, социальной интегрированности. Это не фиксированное состояние бытия, не состояние добродетели, удовлетворенности, счастья; это не конечный пункт, а направление, в котором человек движется, следуя своей истинной природе. По мнению исследователей, сущность природы человека конструктивна, реалистична, разумна, активна и весьма заслуживает доверия [4].

И.В. Дубровина отстаивает принципиальное различие терминов «психическое здоровье» и «психологическое здоровье»: первый, по мнению автора, относится к отдельным психическим процессам и механизмам, второй – к личности в целом, находится в тесной связи с высшими проявлениями человеческого духа [8].

В ряде психологических работ психическое здоровье соотносится с переживанием психологического комфорта и психологического дискомфорта. Психологический дискомфорт возникает в результате фрустрации потребностей личности, приводящей к депривации [9].

А. Маслоу проблему психического здоровья человека связывал с постоянным поиском своего предназначения. Известный исследователь считал, что главным показателем психического здоровья выступает самоактуализация как изначальная способность человека. Это понятие включает в себя всестороннее и непрерывное развитие человека, максимальную реализацию всех его возможностей, богатство эмоциональной сферы и духовной жизни, высокий уровень психического здоровья и нравственности, адекватное

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восприятие окружающих, мира и своего места в нем, т. е. включает в себя и самооценку личности.

Опираясь на определение Всемирной организации здравоохранения, психическое здоровье – это состояние благополучия, при котором человек может реализовать свой собственный потенциал, справляться с обычными жизненными стрессами, продуктивно и плодотворно работать, а также вносить вклад в жизнь своего сообщества [11]. Психическое здоровье — это не состояние непрерывного блаженства, а взаимодействие как отрицательных, так и положительных эмоций и настроений. Психически здоровые люди пытаются сбалансировать и развить различные стороны своего «я» — физическую, психическую, эмоциональную, а иногда и духовную. Они ощущают целесообразность своего существования, контролируют свою жизнь, чувствуют поддержку окружающих и сами оказывают помощь людям. Люди, пережившие тяжелую психологическую травму, часто одерживают победу над болью, страхом и одиночеством благодаря установке, которую они сами задают своей психике. Открытая, активная, оптимистичная позиция помогает превозмогать беды.

Г.С. Никифоров [10] в качестве критериев психического здоровья называет психическое равновесие, гармоничность организации психики, адаптивные возможности психики. Здоровый человек – это человек гармоничный. Соответственно, аномалии в развитии личности наиболее ярко заявляют о себе в проявлениях ее дисгармонии, утрате равновесия с социальным окружением, то есть в нарушении процессов социальной адаптации, сопряжения с социумом. От степени выраженности психического равновесия зависит мера уравновешенности человека и объективных условий, его приспособленность, адаптированность к ним. У человека неуравновешенного, неустойчивого фактически нарушено равновесие,

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гармоничное взаимодействие между свойствами, лежащими в основе его личностного статуса. Таким образом, важнейшими факторами, влияющими на состояние психического здоровья человека, являются генетические, социальные, эмоциональные.

Самооценка относится к эмоциональным факторам. Рассмотрим данный аспект личности с позиции психического здоровья.

Самооценка – одно из базисных качеств личности, одна из главных его функций – защитная, которая предполагает под собой обеспечение относительной стабильности и независимости личности. Самооценка является регулятором поведения личности, способствует её формированию.

В отечественной психологии (Б.Г. Ананьев, Л.И. Божович, И.С. Кон, С.Л. Рубинштейн, В.Ф. Сафин, И.А. Чеснокова, В.В. Столин, А.В. Захарова, Л.В. Бороздина, О.Н. Молчанова и др.) самооценка рассматривается в трёх теоретических ракурсах: как компонент самосознания, как центральное личностное образование и как компонент психического здоровья. В рамках последнего обособляются исследования детерминации самооценки и факторов внешней среды (Н.С. Глуханюк, А.И. Колобкова, А.А. Печеркина и др.).

Как компонент самосознания (Б.Г. Ананьев, Л.В. Бороздина, И.С. Кон, С.Л. Рубинштейн, В.В. Столин, И.И. Чеснокова и др.) самооценка трактуется учеными как стержень процесса самосознания личности, его интегрирующее начало, показатель индивидуального уровня развития. Так, по мнению И.И. Чесноковой [14], самооценка на каждом возрастном этапе становления личности, с одной стороны, отражает уровень самосознания и эмоционально-ценностного отношения к себе, с другой стороны, является важнейшим внутренним условием их развития.

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Исследования К.А. Абульхановой-Славской, Л.И. Божович, И.С. Кона, К.К. Платонова, В.В. Столина относят самооценку к центральным личностным образованиям. По мнению учёных, самооценка функционально связана со всеми личностными структурами. Она влияет на направленность личности и во многом определяет степень её активности. Л.В. Бороздина [3] отмечает, что самооценка в значительной степени может детерминировать личностный комфорт или дискомфорт, выраженный в степени принятия субъекта, его удовлетворенности собой. Кроме того, самооценка служит источником наполнения знаний человеком о себе, знаний особых, прошедших оценку, поэтому имеющих более высокий порядок.

По мнению Бернса [2], есть три момента, существенных для понимания самооценки. Во-первых, важную роль в её формировании играет сопоставление образа реального Я с образом идеального Я, т.е. с представлением о том, каким человек хотел бы быть. Это сопоставление часто фигурирует в различных психотерапевтических методиках, при этом высокая степень совпадения реального и идеального Я считается важным показателем психического здоровья. Таким образом, чем меньше разрыв между реальным представлением человека о себе и его идеальным Я, тем выше самооценка личности.

Во-вторых, важный фактор для формирования самооценки связан с интериоризацией социальных реакций на данного индивида. Иными словами, человек склонен оценивать себя так, как, по его мнению, его оценивают другие.

Наконец, в-третьих, на формирование самооценки существенное влияние оказывают реальные достижения личности в самых разнообразных видах деятельности. И здесь, чем значительнее успехи личности в том или ином виде деятельности, тем выше будет и ее самооценка.

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Следует особо подчеркнуть, что самооценка независимо от того, лежат ли в её основе собственные суждения индивида о себе или интерпретации суждений других людей, индивидуальные идеалы или культурные нормы, всегда носит субъективный характер.

Как компонент психического здоровья самооценка рассматривается в зарубежных исследованиях гуманистического, феноменологического и экзистенциального направлений (А. Маслоу, К. Роджерс, В. Франкл, Р. Мэй и др.), в работах отечественных психологов – Б.С. Братуся, И.В. Дубровиной, О.И. Моткова , А.М. Прихожан и др.

Так, по мнению А. Маслоу, необходимым условием самоактуализации личности является нахождение человеком верного представления о самом себе. Для этого ему необходимо прислушаться к своему голосу как «голосу импульса» [9].

Идеи В. Франкла состоят в том, что степень самоисполненности зависит от способности индивида ставить такие цели, которые наиболее адекватны его внутренней сути. Чем понятнее человеку его призвание, смысл его жизни, т.е. чем отчетливее выражено самоопределение, тем вероятнее самоосуществление. Именно обладание такими жизненными целями является условием сохранения психического здоровья. Смысл – это всякий раз смысл конкретной ситуации, и нет такого человека, для которого жизнь не держала бы наготове какое-нибудь дело. Надо найти это дело, этот смысл, а у ребенка надо воспитывать готовность к нахождению смысла жизни. Возможность осуществить смысл всегда уникальна, и человек, который может ее реализовать, всегда неповторим [13].

Отечественные психологи указывают на то, что причиной нарушений психического здоровья является неправильное распределение напряжений во внутренней

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структуре личности. Наиболее значительным из них является напряжение между тем, что человек собой представляет, и тем, чем ему, по его мнению, следует быть. Показателями психического здоровья являются принятие ответственности за свою жизнь, принятие себя, осмысленность индивидуального бытия и способность к пониманию и принятию других.

Теоретические выводы о роли самооценки в развитии личности, самосознания и психического здоровья подкрепляются многочисленными экспериментальными исследованиями (С.Х. Асадуллина, А.А. Березовская. Л.В. Бороздина, С.А. Дружилов, А.В. Захарова, Л.Н. Корнеева, Л.С. Митина, Э.Л. Носенко и др.).

Так, А.А. Березовская, изучая проблему взаимосвязи самооценки и самоактуализации в контексте психологического здоровья, отмечает, что у испытуемых с низкой самооценкой повышена утомляемость, напряженность и низкая степень активности при осуществлении жизненных предназначений. В то время как у испытуемых с высокой самооценкой установлена взаимосвязь с общей оценкой умственной работоспособности ($r=0,69$, $p<0,05$), оценкой инициативы ($r=0,55$, $p<0,05$) и сильной верой в осуществление жизненных предназначений [1].

В.А. Якунин, раскрывая роль самооценки в детерминации успешности педагогической деятельности, отмечает, что чрезмерно низкая самооценка вызывает у человека состояние неуверенности, робости, подавленности, что не может не привести к снижению трудовой активности и продуктивности профессиональной деятельности. Очень завышенная самооценка ведёт к остановке и регрессии в развитии человека как личности и субъекта деятельности. Всякое несовпадение самооценки человека с оценками его другими людьми, как правило, служит индикатором

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внутригрупповых конфликтов и напряженной социально-психологической атмосферы в коллективе [15].

В нашем исследовании было установлено активизирующее воздействие самооценки на становление профессионального сознания будущего учителя [6]. Так, коэффициент корреляции между показателями профессиональной самооценки и профессиональной активности составил 0,43 ($p<0,05$).

Таким образом, самооценка, подобно мотивации, определяет меру активности личности, и адекватное представление о собственных достоинствах и недостатках побуждает человека прилагать усилия, чтобы добиться дальнейшего продвижения к профессиональному мастерству. Поэтому «степень адекватности самооценки, её расхождения или совпадения с внешними социальными оценками могут служить признаком и индикатором прогресса или остановки профессионального развития личности» [15, с.404].

Приведённые результаты позволяют сделать вывод о том, что самооценка различных показателей жизнедеятельности личности непосредственно взаимосвязана с уровнем психического здоровья, т. е. повышая самооценку физического и психологического состояния личности можно способствовать самореализации личности и укреплению психического здоровья.

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ОСОБЕННОСТИ ФОРМИРОВАНИЯ ЭКОЛОГИЧЕСКИХ ЦЕННОСТЕЙ В СИСТЕМЕ ВЫСШЕГО ОБРАЗОВАНИЯ

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Аннотация: в данной статье рассматриваются особенности формирования экологических ценностей в педагогическом университете. Выделаются компоненты экологического сознания, а также условия успешного формирования экологических ценностей
Ключевые слова: экологические ценности, сознание личности, студенты

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FEATURES OF FORMATION OF ENVIRONMENTAL VALUES IN HIGHER EDUCATION
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Abstract: This article describes the features of formation of environmental values in Pedagogical University. Crafted components of environmental awareness, as well as the conditions for the successful formation of environmental values.

Key words: environmental values, consciousness of identity, students

Проблемы экологической культуры, экологического образования и сознания исследуются сегодня представителями гуманитарных, естественных и технических наук.

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Будущее природы и судьба планеты, зависит в конечном счете от уровня образованности, культуры и духовности каждого человека, человечества в целом [1].

Ряд проблем экологического образования в настоящее время продолжает оставаться актуальными. Одна из них — формирование навыков, отношений, ценностей, мотивации к личному участию в решении экологических проблем с целью улучшения качества окружающей среды [4].

Проблема экологического образования и воспитания, формирования экологических ценностей лежит на стыке таких наук, как психология, педагогика и экология.

Обратимся к исследованиям в области педагогики и психологии.

В научно-исследовательских трудах В.Н. Дикого, Е.М. Кудрявцевой, А.В. Миронова, Е.А. Соловьевой и др. раскрыта роль нравственного и эстетического воспитания в формировании экологической культуры личности.

Важная роль в изучении психолого-педагогических особенностей отношения к природе принадлежит Л.И. Божович, А.В. Запорожец, С.Д. Дерябо, А.Н. Эльконину, Э. Эриксону, которые указывают на необходимость учета возрастных особенностей при разработке эффективных методов экологического воспитания [2].

Все перечисленные исследования внесли существенный вклад в изучение проблемы экологического воспитания, однако в настоящее время остро стоит вопрос необходимости изменения общественного сознания и формирования экологических ценностей.

Необходимость формирования экологических ценностей обусловлена отсутствием потребности у молодежи придерживаться основных моральных категорий, определяющих нравственное обязательство личности перед обществом и окружающей средой.

Экологические ценности тесно связаны с таким понятие как «экологическая культура».

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Сущность экологической культуры может рассматриваться как единое экологически развитое сознание[5].

Для начала разберемся что собой представляет сознание личности с точки зрения психологии.

Психологическая характеристика сознания человека включает ощущение себя познающим субъектом, способность мысленно представлять существующую и воображаемую действительность, умение управлять собственными психическими и поведенческими ресурсами, контролировать собственные эмоциональные состояния, управлять ими, способность видеть, воспринимать, анализировать окружающую действительность и на основе данного мировосприятия формировать и совершенствовать собственную личность [3].

В психологии выделяют несколько компонентов сознания:

-когнитивный компонент, т.е. это всё, что связано с познанием. Он включает в себя способы и методы познания, относительно устойчивые особенности познавательных процессов, которые выражаются в познавательных стратегиях, в частных познавательных установках и видах контроля.

-эмоциональный компонент. Он включает в себя эмоции, отношения, личностные смыслы и самооценки.

- поведенческий компонент включает в себя механизмы, способы, приёмы, обеспечивающие функционирование человека как во внешнем пространстве, в том числе в пространстве межличностных отношений, так и во внутреннем, психическом пространстве.

Рассмотрев вышеуказанные компоненты сознания, можно предположить, что экологическое сознание – это тоже самое сознание, но имеющее свой специфику и направленность.

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В таком случае когнитивный компонент экологического сознания будет представлен экологическими знаниями, есть результат процесса познания личностью ожидаемой экологической деятельности; отражением в сознании человека экологических представлений, понятий, суждений, гипотез, теорий, принципов, законов, закономерностей.

Эмоциональный компонент экологического сознания будет складывается из экологической самооценки, позитивного отношения к субъектам природы, рефлексивных связей с ожидаемой экологической деятельностью, основанной на способности к мысленным отражениям своих чувств относительно природных объектов и действий в природной среде.

Поведенческий компонент будет отвечать за процессы актуализации экологической цели и саморегуляции экологической деятельности, сознательное стремление завершить экологическую деятельность соответственно намеченной программе, направленной на достижение предполагаемого экологического результата.

Таким образом, можно сделать вывод, о том, что экологическое сознание личности - это понимание и осознание себя частью природы, необходимости охраны природы, принятие на себе ответственности за сохранение как отдельных видов животных и растений, так и в целом жизни на Земле.

Мы разделяем точку зрения В.А. Скребеца в том, что экологическое сознание представляет собой высший уровень психического отражения природной и искусственной среды, своего внутреннего мира, рефлексия места и роли человека в биологическом, физическом и химическом мире, а также саморегуляция данного отражения[2].

При современном состоянии экологических проблем, очень важно формировать экологическое сознание и

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экологические ценности всем людям, независимо от возраста и профессии.

Одной из актуальных проблем можно выделить проблему формирования экологических ценностей у будущих учителей. Именно учителя играют важную роль в воспитании подрастающего поколения, и им самим необходимо обладать определенной системой ценностей, чтобы в дальнейшем прививать их своим ученикам.

Очень важно формировать систему экологических ценностей: рационального природопользования, экологической культуры в педагогическом процессе для обеспечения гармоничного взаимоотношения будущих учителей с окружающей средой.

Основными педагогическими условиями формирования экологических ценностей являются: побуждение к внутренней мотивации и рефлексии собственной социально-экологической деятельности; воспитание и формирование субъектной позиции этой деятельности, управление системой формирования экологических ценностей; интеграция экологических знаний, формирование оценочных суждений [2].

В учебном процессе формирования у будущих учителей экологических ценностей включает целеполагание, т.е. стимулирование интереса к экологическим проблемам и организацию учебной деятельности по межпредметному принципу в совокупности дисциплин педагогического, психологического и экологического цикла.

Также следует отметить, что необходимо насыщение практических занятий эмоциональным содержанием экологического характера и создание благоприятной психологической атмосферы при освоении экологических идей и ценностей.

Таким образом, экологизация современного образования обусловливает формирование системы экологических ценностей через проникновение идей,

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концепций, принципов, подходов экологического знания и культуры в систему подготовки педагога.

Самое существенное в процессе формирования экологических ценностей является перестройка сознания. При этом одним из важнейших моментов является нравственно-экологическое воспитание и просвещение в семье, учебных учреждениях и во всей системе общества. Нормы нравственного отношения к природе, ставшие внутренней потребностью, могут сыграть важную роль в решении экологических проблем.

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ROMA BOTANICA

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Abstract: This study focuses on the analysis of an innovative format of mass events in the city, a night bike ride with experts' comments of ecological, botanical, historical and cultural content. Roma Botanica has a mission to present a cultural history of plants and gardening practices in Rome from antiquity to these days.

Key words: ecological education, roman botany, gardening, youth event.

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Introduction

The main problem posed by the authors of the project is how to open the city to its inhabitants. The routine life keeps a citizen remaining passive or unengaged. The intention of the project, its mission is the generation of the culture code of a big city, valorization of its values, especially environmental consciousness-raising, using the actual language of communication in motion conditioned by a physical exercise.

The chosen form of communication with the young generation combines elements of a lecture, a sport trip and an art event with multimedia support.

We define the city code as a set of behavioral systems, including speech formulas, cultural tastes and preferences of one belonging to a community [1;2]. And the landscape plays a significant role in the perception of a megalopolis.

Usually, someone who wants to feel well in a town develops elements of the code - catch phrases, sets of associations, connotations, landscape orientation and others. All this creates an inner acceptance of the city, introduction to its spiritual life, loving attitude to the environment.

Rome is the metropolis, the only one to keep its importance as a center of the civilized world during more than two and a half thousand years. The plants living in this urban area are studied one trees species after another [3] or by park zones [4]. The trees are considered worth to be monuments [5; 6] or rather are described as an ecosystem [7] and in diachrony, like the Gardens of Sallust [8]. The researchers and the city authorities propose some ways to meet the nature [9; 10].

It was important for the writing team of the *Roma botanica* project to link the different stages of the green life of Rome: from Augustus botanical code of Ara Pacis [11] with the help of paleo-botanists through the Flora Virgiliana and the historical atlas of Rome's gardens [12] to scientific gardening in 19th century [13].

The combination of arts (images of nature in architecture, painting, musical pieces) and sciences (ecology, botany, history)

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is the chosen approach to speak to the participants during this bike excursion [14].

Steps of the Project

1. First stage is the conception itself born one year before the realization. This time it was an art connection: many painters and writers took the stone pine called also umbrella pine and parasol pine (*Pinus pinea*) as an emblematic plant of Rome. It is even called the Italian stone pine.

The manifestation by bike was dedicated to "The Secret Life of Plants", a Grand Tour to the discovery of thirty centuries of history, from the roots to the leaves, of the greenest capital in Europe.

This stage is very important; we collect memories of locals, people born in Rome, their feelings about grass, bush, and trees. One journey down memory lane of a Rome-born girl of 30 got out the two great botanical images: margherita (*Bellis perennis*, daisy in English), as a symbol of spring and hay piles (what a surprise!) she remember having seen everywhere in roman suburbs.

2. The second step is to compose an itinerary with points of force and map the itinerary with http://goo.gl/maps/hXdru [15].

VELONOTTE ROMA BOTANICA (approx. 25-30 km):

1). Meeting point: Orto Botanico di Roma, Trastevere

2). Giardino delle Arancie, the miraculous arrival of oranges, the legend of Saint Dominic's orange tree (or Via XX Settembre)

3). Campo De Fiori because of its catching name

4). Piazza Venezia, the triumph of umbrella pines

5). Via Veneto, "fiori di marmo" which was the main passage through Villa Ludovisi-Boncompagni, occupied before by the Gardens of Sallust (Horti Sallustiani) with famous archeological findings

6). Via Nomentana, “Italietta” with the history of plane trees: from the Tree of Hippocrates in Cos to *Platanus x acerifolia*

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7). Corso Trieste, Viale Regina Margherita being nearby

8). Viale Ungheria cherry trees with the Hanami Japanese tradition of enjoying the beauty of blossoms

9). Villa Medici - Finale stop – which was a part of the gardens of Lucullus, then, in Renaissance epoch, one of the first botanical gardens in Rome (1576): pine, oak, rare plants. It was modeled upon Cosimo Medici gardens in Florence and Pisa; Piazza di Spagna with his palms is nearby.

3. The third step is the composition of the expert team. The planning was made in Italian to be send for the discussion to the members of the expert team. The following experts and scholars accepted the invitation: Prof. Massimo De Vico Fallani (Università di Roma "La Sapienza"), Prof. Giulia Caneva and Flavia Bartoli (Università Roma Tre), Dr Alberta Campitelli (MACRO/ Comune di Roma), Prof. Marina Avdonina (Università di Mosca PFUR), Prof. Carlo Blasi (director of Museo Orto Botanico di Roma), Dr Emilia Talamo (Museo Centrale Montemartini/ Comune di Roma).

If the specialist could not confirm his participation the night of the event, we made an interview beforehand in a dialog with Prof. Sergey Nikitin (director of *VeloNotte International*).

4) This stage includes a series of mesures to have a support of city of Rome authorities, ENIT (Agenzia Nazionale del Turismo), Consulate of Italy in Moscow, Italian Cultural Institute. Academic Partners joining us were State University of Rome "La Sapienza", Higher School of Economics (Moscow). We achieved to make two press conferences (in Rome, at the House of Cinema in Villa Borghese and in Moscow in the RIA "Novosti"); the event was announced in Metro (Moscow) and in Il Messaggero (Rome), Image Srl (Italy), E-Architect (UK), Archi.ru (Russia), etc.. Unfortunately, we could not get radio transmission during the whole excursion as we always do in Moscow.

5) A film (an animated cartoon) has been made to promote the event. Its characters present the conception: Lucullus is

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cutting the shrub of the hedge of his famous garden, a pretty singer on a bike watch him doing it:

6) D-Day. Rome (May 2014).

The event started at 6 p.m. from the Botanical Gardens (Orto Botanico di Roma since 1883). It is situated beside the Palazzo Riario-Corsini on the slopes of the Janiculum (Gianicolo) west of the Tiber and outside the boundaries of the ancient city. So this hill, the second-tallest in the city, is not among the proverbial Seven Hills of Rome. The Gardens have been here since the Renaissance as the Papal Botanical Gardens. Now the special plants are cared for by the Department of Environmental Biology of the Sapienza University.

For the occasion the garden Orto Botanico di Roma was open to walking tours (first it was planned to open at at 5 p.m., but finally, it was open the whole day for free). Free guided tours called "Plants of the Roman Velonotte" were carried out especially to give to the participants an up-close opportunity to hit the high spots of the plants collection. We could see the bamboo garden, the rose garden, the Japanese zen garden, the Valley of ferns, a special ‘garden of aromas’ (Giardino dei Semplici) with unique species distinct for their tactile or olfactory features.

Prof. Carlo Blasi, director of the Museo Orto Botanico di Roma was the first expert speaking, he made an introduction and explained the holm oak, broad-leaved evergreen species, expansion.

Then the itinerary was roughly changed because of the demonstration for the legalization of marijuana, so we missed the Orange Garden, and oranges and St Dominic, organization of gardens, parks and local open spaces in Mussolini times by De Vico, all the carefully prepared photos and speeches about these important topics were placed in shot version in others parts of the excursion. Bad luck, it is a green terrace with a splendid view:

The biodiversity of ancient Rome was the topic of the stop at Porta San Sebastiano.

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The stop in Hippocrates Street and Nomentana Street was dedicated to the history of fashion for plane trees in European cities in 19th and 20th centuries (S. Nikitin)) and to the present day plane trees dying (Prof. C. Blazy)

The stop near Villa Torlonia, green Art Nouveau style of the Trieste district had a detailed description of plants in architecture and painting, presented by Dr Alberta Campitelli (Museo d'Arte Contemporanea di Roma / Comune di Roma). She mentioned Claude Lorrain (1600-1682), lover and poet of Rome, master of Roman landscape. Cherry trees of the place were explained as a symbol of friendship between Fascist Italy and the new power of Japan [16].

At Villa Ada, we turned to the Roman flora. Flavia Bartoli, one of the co-authors of the present study, a graduate student Universita Roma 3 told about classical forms in the ancient Rome

As has been said before Pini (Italian for *Pinus pinea*) are very important in urban forest patches (as well as laurel and oaks, Ada's pines

Can we call this plant endemic? Or rather we can say that the Rome of Ancient Times was the center of attraction for "good" plants? Woody vegetation types inside the Villa Ada space are evergreen broadleaves, deciduous broadleaves and conifers distributed in equal parts, the same for periurban vegetation of the whole Rome Municipality. Here we discussed functional biodiversity and city green infrastructures.

At the Villa Borghese stop we spoke about Italian gardens of the Renaissance and Baroque periods, especially about the Secret gardens recreation., the Valley of Plain Trees (Alberta Campitelli's topic), the panoramic Pincio Terrace. Dr. Emilia Talamo (Museo Centrale Montemartini, Comune di Roma) talked about her investigation of the gardens of Lucullus [5] and their actualization in the urban politics of the twentieth century.

Pines became the basis for the creation of the main public space of the city, Piazza Venezia, and the Columbus Street (until 1945, a single Empire Street of many kilometers, connecting the

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political center of the city, the Capitol and seaport of Ostia), Trieste Avenue, and many other ensembles. These spaces became an iconic "postcard" of Rome.

The trip closed at the Spanish Steps with performances of theater and dance coordinated by Marianna Galloni and with an "opera" flash mob.

Discussion

Environmental education of young and new coming citizens includes knowledge and emotions. How to keep people interested and concerned by the big problems of their great home – Rome?

There is a series of environmental connotative elements that we regularly introduce in the itineraries in Moscow and Saint Petersburg: that oak remembers Peter the Great, we showed it during the “Thatched hut” walk, Moscow; or this is Lysa’s pond, in another Moscow walk, and we recalled "Poor Liza" tragic story by N. Karamzin: we played cheerful music and read literary lines installing the Poor Liza living sculpture on the banks of the pond.

Let participants smile and get involved, this is the most efficient way to instill an attitude of love, a habit to notice trees and bush in the street, to care for them. Persistent instruction, repetition has some effect, of course, but an exclusive extraordinary experience does much more, we are sure.

A noteworthy detail can trigger a further search.

Another little but quite a significant thing is to inform our audience about the success of any kind. We published on the website the letter of the Mayor of Rome according his patronage to *Roma botanica*:

Conclusions

The idea of such an educative sport adventure (about 25 km on bicycle) came from one of the authors of the present paper, a young university professor of Moscow, Sergey Nikitin, having invented in 2007 this formula that combines the ecological lessons, historical commentary on roman botany and urban planning. One could call it “educative pedaling”.

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The 4-hour itinerary collected plants that adorn the gardens, the villas and the streets. It was an unforgettable evening with the brilliant Roman botanists, historians and garden restorers. For this purpose, a scenic route to enjoy and understand the attractiveness of the greenest capital in Europe, Rome, was elaborated. The bike-event was guided by Roman practitioners, gardeners, scientists paleobotanists, architects and artists.

Velonotte project as well as the Heritage Days in France, days of urban areas, Christmas markets, the Museums Night in many cities and similar ones can help shaping the perception of the city as a code to decipher. At the same time, Roma Botanica is one and only event, because we consider that we have to fight against a tendency to routinization of the city life.

Rome is a lucky metropolis: irrigation, pruning, maintenance of green spaces take advantage of climatic benefits and, these last years, the removal of air pollutants. Now personal behaviour is becoming more and more significant for the Roman flore (not to walk between the trees crushing the roots, for instance). It is very important to a new resident to know how to behave managing the urban park and its trees. The newcomer must quickly adapt his tastes to perceive the city code, particularly, the love for nature, an understanding of the vernacular nature of the landscapes of the Eternal city.

Socialization is always based on the informational and emotional flows.

It is recommended to implement similar projects of local importance, linking microlandscape with great events.

The participants wrote their impressions many month after the event, mentioning that they have shown the trees to friends, that they look at the gardens with a new eye. And that they feel historical pride to live in Rome. So the task has been solved: we achieved the increment of the meanings of the cultural landscape.

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FORMATION OF A STRONG PROFESSIONAL INDIVIDUALITY UNDER THE INNOVATIVE REFORM CONDITIONS

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Abstract: This article discusses the theory of human ecology, as well as aspects of formation and development of students' innovative style of thinking. Planning of a professional future, building up of one's own direction vector of personal, educational and professional development is under consideration.

Key words: human ecology, health, innovative style of thinking, the career planning process.

Период глобальных изменений современного мира затрагивает множество сфер человеческой деятельности, что способствуют развитию общества и ускорению прогресса. Благодаря инновациям человечество отказывается от привычных подходов, развивает интеллектуальную деятельность, творческое мышление и изобретения.

Как отмечает С.А. Дружилов [1], экология человека имеет прямое отношение к проблемам здоровья. По определению всемирной организации здравоохранения

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(ВОЗ), здоровье – это состояние полного физического, душевного и социального благополучия, а не только отсутствие болезней и физических дефектов (Устав ВОЗ, 1946 г.). Выделяются три компонента: физическое, психическое и социальное здоровье [2].

Здоровье является одним из важнейших показателей социально-экономического и социально-культурного прогресса общества, а одним из важнейших «инструментов» формирования культуры личности, культуры здоровья является сознание. Сознание человека имеет определяющее значение для его здоровья [3] как механизм взаимодействия и приспособления субъекта к окружающему миру.

Индивидуальное сознание отражает объективную действительность и отношение к ней, позволяет проникнуть в сущность предметов, процессов и получить нужную информацию о них [4]: выдвигает гипотезы, догадки об окружающем мире и подтверждает или опровергает их. Сознание способно не только подтверждать ожидания человека, но и корректировать их, а в некоторых ситуациях даже опровергать [3].

Внедрение новых инновационных технологий повышает качество жизни населения. Вместе с тем, инновации – это умственно затратный процесс. Чаще всего человеку необходимо исправлять свои ошибки, решая сложные задачи. В процессе обучения студентов за короткий студенческий курс и с учётом особенностей человеческого сознания необходимо освоить современные технологии, которые становятся более сложными, наукоемкими.

На первых этапах обучения студент осознает трудности и проблемы, связанные с профессиональным становлением, их причины и, ещё важнее, методы их решения. В связи с этим, вузовская подготовка должна развивать у студентов инновационный стиль мышления, который можно определить как готовность к творчеству, к нахождению оригинальных способов решения проблем и способность к

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постоянному поиску нестандартных способов осуществления любой деятельности. Данный стиль мышления предполагает формирование у студентов отношения к существующей системе окружающего мира как к динамичной, подлежащей изменениям [6]. Необходимо воспитывать у обучающихся позитивное отношение к своему умственному, эмоциональному, социальному и физическому здоровью, чтобы они были более устойчивы к стрессовым ситуациям и могли построить наиболее эффективный план своего профессионального будущего. Планирование профессионального будущего – это одна из главнейших и трудных задач в современных социально-экономических условиях. Благодаря такой работе студент сможет выстроить собственную траекторию личностного, образовательного, профессионального развития, «целенаправленную саморегуляцию поведения на основе предвидения отдаленных событий будущего» [3, с. 152].

Наше исследование показывает, что процесс планирования профессионального будущего состоит из следующих четырех этапов:

1) оценка само себя как способного к определенному роду деятельности;

2) поисковых действий по пониманию, каковы требования к личности, предъявляемые в выбранной профессии;

3) прикидочное представление о том, насколько выбранная профессия подходит к типу личности определенного человека (в нашем случае – самого обучающегося);

4) действия по подготовке и по вхождению в профессиональную деятельность и профессиональное сообщество.

Все эти четыре этапа обучающийся может пройти самостоятельно, но преподаватели способны помочь ему

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разобраться и в профессиональных требованиях и в своих собственных склонностях и свойствах.

Прежде, чем мы можем будем говорить с обучающимся о трудовых традициях и ценностях выбранной профессии, мы должны обсудить, какие ценности являются в целом важными для нашего общества, для профессионального круга, для самого обучающегося.

Высшими личностными образованиями вляются убеждения и идеи о мире в целом. То, что важно для данной личности, то, что имеет для обучающегося личностный смысл, и есть то, что направлять его действия. Важно обсуждать в ходе обучения такую профессионально важные ценности, требующие усилий морального характера, как «быть честным» или выйти из круга своих обязанностей, чтобы «помочь другим», или «быть независимым».

Главное, что должен усвоить обучающийся – это сам факт, что общие принципы построения линии жизни непосредственно влияют на путь в профессии, что в конечном счете и определяет весь жизненный путь человека. Ценности, актуализирующиеся в последствии на этапе принятия профессиональных решений, являются также и важной частью того комплекса сложных отношений, который выражается в вопросе «КТО Я?». И поэтому их надо принимать во внимание, когда выбирается профессия или, в более частном случае, когда принимается решение согласиться или нет на ту или иную профессиональную позицию. Учитывая ситуацию с занятостью, отсутствием вакантных рабочих мест по нравящейся специальности, люди сдаются и принимают предложения, внутренне их не вдохновляющие. В процессе обучения преподаватель должен разъяснять обучающимся, что в таком случае у человека мало шансов найти удовлетворение от работы.

Обсуждение приводит к различению того, что можно назвать внутренними и внешними ценностями. Внутренние ценности связаны и с не всегда осознаваемыми

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побуждениями, тайными желаниями, которые являются основой для решения реальных жизненных задач, конкретного задания по работе. Внешние ценности скорее включают оценку себя глазами других, общества.

Здесь преподаватель должен разъяснить такое важнейшее положение, как «включение в референтную группу». Мало ли кто сообщает юному человеку свое мнение о результате его действий, о нем самом, о его профессиональных успехах или неуспехах. Важно четко делить таких оценивающих «других» на тех, к мнению которого стоит прислушаться в данном случае, и тех, чьим мнением можно пренебречь. Иначе молодой специалист, желая понравиться всем, будет метаться от одной крайности в другую. Примером истинных ценностей могут быть:

- взаимопомощь;

- выбор работы не приносящей сразу всего, но перспективной.

признание окружающих;

- надежная работа на много лет в области, где в перспективе спрос будет только расти.

- стремление быть лидером.

Дело преподавателя задавать вопросов, которые могли бы побудить обучающегося к самопознанию:

1) Предпочитаете ли вы работать самотсоятельно или быть частью коллектива?

2) Стремитесь ли вы к престижной работе?

3) Хотите ли вы иметь высокий авторитет у сотрудников вашего предприятия?

4) Что вы предпочтете: уверенность, что это рабочее место всегда будет за вами, или более интересную работу, но с риском все потерять?

5) Важно ли для вас, что ваша работа будет иметь общественную значимость? Или вы цените прежде всего хорошую зарплату ?

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6) Важно ли для вам признание, теплый прием, внимание к результатам вашей работы ?

7) Понимаете ли вы высокую зарплату как компенсацию за тяжелую неинтересную деятельность?

8) в чем вы видите удовольствие от работы?

9) Используя свои навыки, с помощью образования и опыта работы, хотите ли вы сделать вашу работу новой, изменить правила игры ?

10) Нравится ли вам лидерство, контроль, управление другими?

11) Что вы предпочитаете: творчество или исполнительскую работу по правилам?

12) Считаете ли вы разнообразие, необходимость сочетания различных видов деятельности, использование свои собственных идей положительным или отрицательным качеством предлагаемого места работы?

13) Любите ли вы выбирать задачи потрудней?

14) Насколько для вас важно иметь досуг?

15) Ищете ли вы художественного выражения своей личности, выражения своих талантов на рабочем месте?

16) Стремитесь ли вы приобретать влияние, иметь возможность влиять на мнения и представления людей?

Сравним молодое поколение и специалистов зрелого возраста. Первые, хотя и менее опытные в профессиональной деятельности испытывали пока мало неудач, они более инициативны и генерируют больше новых идей и не боятся ошибиться. Более опытные специалисты проявляют меньше инициативы, у них больше психологических комплексов, связанных с предыдущим опытом внедрения чего-то нового.

На примере больших и малых городов можно сказать, что внедрение инновационных технологий происходит интенсивней в больших городах, потому что в них расположены основные промышленные и социальные структуры, что подразумевает внедрение инноваций в разных сферах и создание инновационных проектов. В

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малых городах экологическая обстановка благоприятней, чем в больших городах, и все же у людей присутствует желание переехать в большие города. Но переезд влечет за собой ухудшение здоровья из-за множества факторов: нарушение личного пространства, плохое питание, нездоровая экологическая обстановка и др.

Экология человека, сознание и инновации – это замкнутый круг. Сознание позволяет человеку познавать окружающий мир, ориентироваться в окружающей среде, регулировать свою деятельность, создавать инновационные идеи. Создание какой-либо инновации приводит человека к осознанию своей полезности для общества, способствует повышению его самооценки.

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ECOLINGUISTICS AND ENVIRONMENTAL DISCOURSE

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CREATING NEW ENVIROMENTAL TERMS

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Abstract: The system of terms in the field of ecology, in English, French and Russian has been investigated. Relevant features of operating and semantics are revealed. The resemantization as a process of filling a form with a new meaning which ensures the formation of new lexical unit making part of ecological terminology is determined. Humorous and ludic elements, new words becoming obsolete, désémantisation of terms of compared languages are studied.

Key Words: ecological terms, semantic change in lexical units, new meanings

Introduction

Environmental concepts are nominated with linguistic signs of different nature: highly technical terms and common words acquire new values due to communicative and pragmatic tasks: the term emphasizes that humanity is to be seen as a part nature,

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there is interplay between social and ecological systems reflexing in term system.

Polyparadymal approach is elaborated these last decades for investigations in linguistic typology [1].

Theory of translation is applied to make recommendations for young interpreters on environmental texts, covering cultural, cognitive, communicative and functional aspects [2].

Systems of environmental terms in French and Russian are being studied by our team in such aspects as typology, semantics and functions [3].

The study of psychological aspects of interpretation of the semantic structure of analyzed units revealed the emotional and evaluative components of new environmental terms [4], which is contrary to traditional definition of terms as lexical units. Researchers are also coming to the fact that the modern terms systems include a quantity of polysemic units [5].

Methods and materials

The main goal of the investigation is to make a comparative functional analysis of English, French and Russian terms being used in the texts dedicated to environmental issues. Language material comes from dictionaries [6; 7; 8; 9; 10] and from books on ecology, articles, audio- and video spots, forums and blogs of the Internet. Lexical and semantic analysis is being done in the light of the theory polyparadygmal typological approach [1] in the aspects of epistemology and ontology.

Multilingual and multicultural context of the global community of researchers in the field of environmental protection permits to distinguish four ways of the enrichment of this term system.

1. Ecological terms include firstly the most general lexical units, such as *wind* and *water*, *root* and *bird*…

2. Ecology was born as an aspect of biological science when Wallace's biogeographical work together with Darwin's theory came to the comprehension and awareness of the impact of

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human activities on the nature in a whole. The investigation of the units in environmental texts shows that the terms come from different sciences as soon as the notion or the concept becomes important for the society and are assimilated, sometimes wrongly. Non-specialists speak about ecology using, understanding and interpreting the concepts as they can.

3. Journalists try to render environmentalist ideas clearer, simplifying the content or, very often, the form (for example: *greenhouse gas*).

4. Authorities of all levels produce regulative documents creating units of administrative style.

It is impossible to make a definite glossary of terms of this sphere because at each moment some terms of specific knowledge can enter this term systems as well as there always is the opposite process: terms are no more of interest to the society and return to their place used only by narrowly focused specialists in a specific domain.

As the studied science field is dynamic, changes quickly, ideas and theories contradict the previous ones, lexical units are a part of a certain theory, a certain system of views on the structure of society. The specialized glossaries reflect the opinions of the authors, compilers, so the list of units and their definition do not coincide.

This is partly implicit, but some terms are openly evaluative. Such a content structure has a functional reason: units are utilized in other types of text, firstly, in politics, in administrative documents, in mass-media.

Re-semantized lexical units [3; 11] (with formation of a very specific new meaning) take a significant place in the studied term systems as well as a complete de-semantization of common units and an expansion of semi-fixed combinations, free phrases and collocations breaking through semantic incompatibility.

Let’s consider the most important ecology phrases: *développement durable* [12] and the corresponding English *sustainable development*. The French term is accurate, albeit with

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a few narrowed value. The good use for more than twenty years allowed *durable* to acquire a special ecological significance. In combination with one and the same word this phrase is interpreted in different ways, for example: 1. *Sac durable* in the conventional sense means a bag that is solid that can serve for years. 2. *Sac durable* in the ecological sense means "in order to protect the environment", "with the spirit and provisions of the concept of sustainable development", namely:

- the dag should be made of environmentally friendly materials,
- the bag should be locally produced,
- manufacture of bags should be located in the region where it is used, production workers have to be from the local community
- Child labor should not be used.

For example: *Sacs durables. Le cabas est donc la solution durable. Il nous faut donc montrer l'exemple en arrêtant de favoriser la consommation du «Jetable» pour lui préférer celle du «Durable»* [13].

Pragmatic problem texts on ecology is to encourage public and political leaders, the general public to take action to protect the environment. The most important pertinent feature of the environmental terms is the inclusion of emotional and evaluative components in the semantics of terms (fr. *pays victime du réchauffement climatique, perte d'habitat, ville durable;* engl. *green party, environmental disaster, vulnerable species, depletion of soil*) [4]. Terms turn into historicisms; humoristic and ludic use of terms has been noticed in recent times as well as new connotations, emotions and evaluations are granted to the sign which was unusual for a term before. This practice is fairly common nowadays.

Conclusions

Ecological term systems distinctions are to be a subject of special study in the training of translators in professional communications.

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Ecological term systems in English and French languages have a great scientific expression and are promptly reflected in dictionaries, encyclopedias and numerous specialized glossaries.

Ecological term system of Russian language is still much more like a set of units of the administrative style; new lexical items have not been certified and are not introduced in the dictionaries.

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Гуслякова А.В.

ЭКОЛИНГВИСТИЧЕСКИЙ ХАРАКТЕР ПРЕДСТАВЛЕНИЯ ИНФОРМАЦИИ В СОВРЕМЕННЫХ РОССИЙСКИХ И ЗАРУБЕЖНЫХ СМИ

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Аннотация: Статья освещает основные проблемы эколингвистики, как нового междисциплинарного научного направления. Проанализированы базовые принципы

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эколингвистической репрезентации информационных сообщений в современном медиадискурсивном пространстве.

Ключевые слова: эколингвистика, эколингвистическая терминология, эко-мышление, медиатекст, медиадискурсивное пространство.

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ECOLINGUISTIC CHARACTER OF INFORMATION PRESENTATION IN THE MODERN RUSSIAN AND FOREIGN MEDIA

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Abstract: The article deals with the main problems of ecolinguistics as a new interdisciplinary research area. The basic principles of ecolinguistical representation of informational messages in the contemporary media discourse space are analyzed.

Key words: ecolinguistics, ecolinguistical terminology, eco-consciousness, media text, media discourse space.

Экологическая тематика является одной из наиболее востребованных в современном обществе, в виду существующих в мире проблем сохранения окружающей среды и физического и психического здоровья человека. Данная тематика широко освещается в СМИ России и за рубежом в многочисленных печатных и электронных медиа публикациях. Таким образом, степень влияния экологической терминологии на формирование и развитие лингвистической структуры медиадискурса в российском и зарубежном медиа пространстве возрастает и требует отдельного освещения в современном гуманитарном знании.

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С точки зрения российского лингвиста Е.Ю. Ильиной, с которой нельзя не согласиться, понятие экологичности демонстрирует относительно новый ракурс изучения дискурса – экологию языка, или эколингвистику [1].

Важно принять во внимание тот факт, что эколингвистика, как новое научное направление (Е.Н. Сердобинцева, А.П. Сковородников, Н.Г. Солодовникова, В.И. Шаховский; Richard Alexander, Arran Stibbe), еще не приобрело четких очертаний, однако в ней уже затрагиваются такие значимые научные междисциплинарные аспекты, как сохранение языкового многообразия, языковая политика государства и международных организаций, вопросы сохранения национального языка и поддержание его нормативности; экология среды обитания языка (системные взаимосвязи разнородных явлений и изучение взаимовлияния среды и языка), нравственная экология (культурная однородность, нравственная самодисциплина, социализация) и многое другое [2].

В рамках эколингвистической интерпретации медиадискурсивного пространства интересным и весомым, на наш взгляд, представляется изучение экоконцептов в немецком газетно-публицистическом дискурсе (Klimawandel (изменение климата), Treibhauseffekt (парниковый эффект), Erwärmung (потепление), Energiesparen (энергосбережение), Abfall/Müll (отходы/мусор), Treibhauseffekt (парниковый эффект), Erwärmung (потепление), Biodiversität (биологическое разнообразие), Abschmelzen (таяние)), представленное в диссертационном исследовании А.А. Лагутиной [3]. Осмелимся предположить, что выделенная исследователем экологическая концептосфера, действующая в пределах немецкого медиадискурса, скорее всего, носит универсальный характер и имеет функциональный смысл в медиадискурсивном пространстве других языков и государств.

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Учитывая повышенное внимание и обращение российских и зарубежных исследователей к проблеме эколингвистического осмысления языковой действительности и медиа пространства, подчеркнем необходимость продолжения изучения *экологического дискурса* (ecological discourse) – явления, прочно вошедшего в жизни миллионов людей в современном мире – в российских и зарубежных СМИ.

Для практического подтверждения данного аргумента обратимся к медиатекстам, извлеченным методом сплошной выборки из российских, французских и англо-американских СМИ за период 2015 год. Анализ результатов подтверждает высокую степень значимости присутствия эколингвистических терминов в медиадискурсах, посвященных разнообразным политическим, социально-экономическим и культурным тематикам как в российском медиа пространстве, так и во французских и англо-американских СМИ.

Например, в британской газете The Guardian встречаем заголовок с призывами прекратить употребление пальмового масла и сохранять леса. «Перестаньте есть Нутеллу и сохраните леса, - предупреждает французский министр по экологии. Сеголен Руаяль говорит, что Нутелла создается с использованием пальмового масла, чье производство способствует вырубке лесов, и предупреждает концерн Ферреро заменить рецептуру производства этой пасты» (перевод мой – А.В. Гуслякова). («Stop eating Nutella and **save the forests**, urges French ecology minister. Ségolène Royal says Nutella is made using palm oil, which is contributing to **deforestation**, and urged Ferrero to make the spread with ‘other ingredients’») (The Guardian, 17.06.2015).

В американском медиадискурсе экологический характер информации довольно часто представлен посредством наиболее значимых эколингвистических

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терминов таких, как например, *глобальное потепление* (global warming) или *изменение климата* (climate change).

«The Pope's **Ecological Vow**. The pope's acceptance that **global warming** is almost certainly man-made has irked the vocal minority with more skeptical views. They say Francis has overlooked the ability of technology to provide solutions to **climate change**» («Экологическое «Вау» Папы Римского. Позиция Папы на глобальное потепление, как результат человеческой деятельности, стало раздражать активное меньшинство с более скептическими взглядами. Они говорят, что Франциск упустил из виду способность технологий находить решения по проблемам изменения климата». Перевод мой – А.В. Гуслякова) (New York Times, 28.06.2015)

В российском медиадискурсе экологическая тематика широко применима как в медиатекстах, посвященных непосредственно проблемам экологии, так и в других общественных сферах жизни.

Например, «**День экологического долга** наступил для жителей Земли» (Аргументы недели, 13.08.2015).

«**Экология – в моде**. От кружев, льна и бисера до веток и пластиковых стаканчиков» (Комсомольская правда, 1.04.2015).

«Звезды ТВ научат подмосковных школьников убирать мусор. В Министерстве экологии региона родилась идея креативных **«экоуроков»**» (Московский комсомолец, 20.06.2015).

Употребление эколингвистических терминов весьма популярно в их метафорическом и метонимическом смыслах, причем как в российском, так и в зарубежном медиадискурсах.

Например, **«an ugly face of ecology»** (безобразное лицо экологии) - заголовок статьи в британском медиа издании «The Guardian», не лишенный скрытой иронии, (The Guardian, 25.04.2015) или **«экология мозга»** - заголовок II

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международного Конгресса и фестиваля здоровья «Экология мозга: искусство взаимодействия с окружающей средой», проводимого в 2014 году Институтом ментальной медицины Северного государственного медицинского университета. (Аргументы недели, 13.05.2015)

«Our **ecological boredom.** Live free or die: This is the maxim of our age.» (Наша экологическая тоска. Живи свободно или погибни: основная максима нашей эпохи. Перевод мой – А.В. Гуслякова) – заглавие статьи в американском медиа издании «New York Times», посвященной свободе выбора, стоящей перед человеком, в современном мире демократий и высоких технологий. (New York Times, 18.01.2015)

Важно отметить, что наиболее яркие эколингвистические термины в их прямом и переносном смыслах встречаются в заголовках медиатекстах, особенно с использованием риторических вопросов.

Например, «**Экологичная красота**. Что такое корпоративная социальная ответственность?» (Аргумента и Факты, 20/04/2015)

Во французском и британском медиадискурсах наблюдается аналогичная тенденция.

«La Question: l'écologie politique est-elle morte?» («Вопрос: политическая экология мертва?» Перевод мой – А.В. Гуслякова) (Lemonde.fr, 23.09.2015)

«L'appel de la terre. Paul Watson, **le pirate de l'écologie**» («Вызов Земли. Пол Уотсон, экологический разбойник». Перевод мой – А.В. Гуслякова) (ParisMatch, 30.07.2015)

«**Eco-fashion**: Why green is the new black for Gucci?» («Эко-мода. Почему зеленый – это новый черный цвет для Gucci?» Перевод мой – А.В. Гуслякова) (The telegraph. co.uk, 1.11.2015)

Таким образом, подводя итог всему выше сказанному, отметим, что эколингвистика, как молодая наука, представляет собой нечто большее, чем простой анализ

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текстовой информации о мировых проблемах окружающей среды. «Ecolinguistics is more than just the analysis of texts which happen to be explicitly about the environment, and is more than just a metaphorical way of thinking about language contact» [6]. Эколингвистическое представление информации в медиа среде, экологический анализ медиадискурса можно интерпретировать как новый способ мышления, эко-мышления, ориентированного на осознание себя как неотъемлемой части существующей живой природы, требующей защиты и сохранения своей уникальности в эпоху стремительного развития и совершенствования высоких технологий, которые в первую очередь отражаются в современном медиадискурсивном пространстве.

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Kaderova R.G.

GEBRAUCH VON INFORMATIONS- UND KOMMUNIKATIONSTECHNOLOGIEN BEIM UNTERRICHTEN DER DEUTSCHEN SPRACHE IM ÖKOLOGISCHEN FAHRSTUHL DER RUSSISCHEN UNIVERSITÄT FÜR VÖLKERFREUNDSCHAFT

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Annotation: Heutige Gesellschaft braucht hochqualifizierte Fachleute mit guten Sprachkenntnissen. In diesem Artikel handelt es sich um die Unterrichtsbesonderheiten der deutschen Sprache als zweite Fremdsprache und Gebrauch von Informations- und Kommunikationstechnologien als Aktivmittel beim Erkenntnisprozess von Studierenden in den Nicht-linguistischen Studiengängen.

Stichwörter: Informations- und Kommunikationstechnologien, Lernprozess, Erkenntnisprozesse, fachorientiert.

Abstract: Modern society needs well-qualified specialists with a good command of foreign languages. The article dwells upon special methods of teaching German as a second foreign language in technical institutions of higher educations. It also touches upon how to use modern information communication technologies as a means of activating the students' language skills.

Key words: special methods of teaching, information communication technologies, activating.

Moderne Gesellschaft mit ihrer politischen, wirtschaftlichen und kulturellen Integrationsmöglichkeiten fordert ein bestimmtes Sprachniveau. Noch vor kurzem war es genügend, Umgangssprache zu beherrschen (z. B. wie komme ich..., wo befindet sich... oder ein Hotel bestellen). Heutzutage, auf einer konkreten sozialen Stufe der Gesellschaftsentwicklung,

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reicht es überhaupt nicht. Viele Leute gebrauchen die Sprache nicht nur wie ein Kommunikationsmittel während der Reise. Weit verbreitet ist die Praxis, auf dem Lande zu arbeiten. Und als Folge dabei ist eine obligatorische Notwendigkeit, eine Fremdsprache frei zu sprechen.

Deshalb steht jetzt sehr akut das Problem der Vorbereitung eines hochqualifizierten, fachorientierten Spezialisten mit guten Sprachkenntnissen. Dies ist gesetzlich in den grundlegenden Prinzipien des Fremdsprachenerwerbs in den Nicht-linguistischen Studiengängen wiederspiegelt. Besonders betont ist die Tatsache, dass „die Fremdsprache ein untrennbares Bestandteil der beruflichen Vorbereitung eines modernen Fachmannes in allen Bereichen ist“ [Konzept...2000, s.7].

Wie bekannt, gibt es viele Methoden, eine Fremdsprache zu beherrschen. Eine der Richtungen ist die kognitiv-linguistische Methode. Der kognitive Ansatz, wie bekannt, geht von einem Stammpunkt aus, dass der Belehrte sich bewusst zum Lehrprozess bezieht und hochmotiviert ist. Daraus kommt, dass der Studierende ein aktiver Teilnehmer und kein Lehrobjekt ist. Laut dieser Theorie muss diese oder jene linguistische Erscheinung sich auf einen Denkprozess und Handlung stützen, die im Grunde des Verstehens und Gebrauchs dieser Erscheinung in der Rede liegt. In der Theorie ist auch betont, eine Notwendigkeit von Besonderheiten der Beherrschung von einem Studierenden jene oder andere Spracherscheinung in Rücksicht zu nehmen und eigenes Lehrprozesses bewusst zu organisieren [1].

Kognitive Linguistik besteht aus einigen selbstendigen Disziplinen, die sich durch gemeinsame Interesse zur Grundlage der Erkenntnis, Denkstätigkeit in Aneignung, Bewahrung und Herausnehmen vereinigt sind. Das kognitive Model akzeptiert Vorkenntnisse, mit deren Hilfe neue Kenntnisse angeeignet werden. Es ist zu betonen, dass diese Kenntnisse nicht immer im Vorhanden sind. Es erschwert den Lernprozess, weil Aneignung

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neuer Lexik und Begriffe, die ihnen entsprechen, parallel verläuft.

Die linguodidaktische Methode, die in die kognitive Methode beschlossen ist, sieht verschiedene Möglichkeiten des Spracherlernens voraus. Das sind globale, teilweise und module Methoden.

Da weiter die Rede vom Spracherlernen in den Nicht-linguistischen Studiengängen ist, wo die Unterrichtsstunden begrenzt sind, möchten wir im Rahmen des Artikels das Modulspracherlernen erläutern, das uns als zweckmäßigste im ökologischen Kontext vorkommt.

Häufig lernt man die deutsche Sprache als die zweite (nach der englischen Sprache), deshalb muss diese Tatsache von Anfang an in mündlichen und schriftlichen Aspekten berücksichtigt sein. Da die Sprachen eine gemeinsame Wurzel haben und in einer Sprachgruppe sind, fällt bei ihnen sehr oft entweder die buchstäbliche oder phonetische Gestalt zusammen *full (en.) – fallen (de.), begin (en.) - beginnen (de.).* Darauf muss man die Studierenden aufmerksam machen. Es muss auch betont sein, dass die Bedeutung dieser Wörter manchmal verschieden ist. Das muss auch in Rücksicht genommen werden *gift - подарок (en.) - Gift – яд (de.).* Wie es schon oben erwähnt wurde, haben die Sprachen gemeinsame Wurzel. Daraus folgt, dass die Mentalität wegen des gesamten Vorvaters, des historischen Prozesses, dynastischer Zusammenhänge, gemeinsames Territoriums fast gleich ist. Deshalb darf man über moderne Gemeinprozesse sprechen. All das muss auch beim Lernen in Acht genommen werden. Wohl bekannt ist, wie wichtig bei der Zusammenarbeit eine herzliche, wohlfühlende Atmosphäre ist, wo jeder Studierende eine Möglichkeit hätte, sein Potential zu realisieren und eigene Identität zu fühlen. Erwähnenswert ist auch, dass Psychologen sogar runde Tische als optimalste für Besprechung und Lösung der stehenden Aufgaben, empfehlen. Von Anfang an muss im Unterricht Multimedien gebraucht werden. Es verbreitet nicht nur

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sprachliche Möglichkeiten, sondern beschleunigt Erkenntnisprozesse, indem die Studenten in eine Suche nach neuer Information und nach der Präzisierung einer vorhandenen hereingezogen werden. Diese Technologien verbreiten ihr Gesichtskreis und Nebenkenntnisse. Das erleichtert den Lernprozess und erlaubt dabei bis dahin unbekannte, fachorientierte Webseiten zu gebrauchen. In unsrem Fall sind sie ökologisch orientiert. Es ist auch nötig, verschiedene Projekte zu realisieren. Diese Tätigkeit stimuliert nicht nur den Gebrauch von neuer Lexik, sondern auch die Suche nach ihren konnotativen Bedeutungen. Solche Zusammenarbeit erlaubt den Studierenden, in Team zu arbeiten, die Meinung des Sprechpartners zuzuhören, sich eigene Meinung zu versteifen. Selbstsuche nach neuer Information muss künftig ein festes Bedürfnis zur Selbstausbildung nachformen, was bei der Realisierung von beruflichen Möglichkeiten so wichtig ist.

Die von Studenten erlernenden berufsorientierenden Hauptthemen müssen mit den Themen in den Sprachunterrichtsstunden zusammenfallen. Deshalb ist es zweckmäßig, ab und zu Vorlesungen in Ökologie in Fremdsprachen durchzuführen. Wenn das gelehrte Material in Fremdsprachen wiederholt sein wird, erleichtert es den Prozess der Aneignung verschiedener, fachorientierter Begriffe von beiden Seiten.

Aus eigener Erfahrung vorausgehend lohnt es sich zu betonen, dass bei der Orientierung nur auf die Fachkomponenten die Schwierigkeiten bei der allgemeingebräuchlichen Lexik entstehen. Ungeachtet dessen, dass die Zeit zu knapp ist und das Modulsystem streng geschränkt ist, müssen unbedingt linguokulturelle Besonderheiten des gelehrten Landes beigebracht werden, um maximal vollständiges Bild über das Land zu bekommen, seine mentalen Besonderheiten zu erfahren und den Zusammenhang zwischen verschiedenen Erscheinungen zu verfolgen. Zweifellos werden diese Kenntnisse sehr nützlich in der zukünftigen Fachtätigkeit sein.

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PRINCIPALES PROBLEMAS EN LA TRADUCCIÓN CIENTÍFICA

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Abstract: The main aim is to identify and describe the main features of the scientific translation. First of all, we did a theoretical approach to the concept of specialized languages texts and their deriving, analyzing their characteristics and criteria for the classification. We focused on the characteristics and the type of scientific texts. Finally, we identified the main problems in the process.

Keywords: scientific translation, specific translation, problems, analysis

La anotación: El presente trabajo tiene como finalidad definir y descubrir las características principales de la traducción científica. Para ello, en primer lugar se ha realizado una aproximación teórica al concepto de lenguas de especialidad y los textos resultantes de éstas, analizando sus rasgos característicos y los criterios para su clasificación. A partir de ahí nos hemos centrado en los rasgos característicos y la tipología de los textos científicos y en el perfil del traductor especializado en este ámbito. Por último se han identificado los principales problemas en dicho proceso.

Las palabras clave: traducción científica, traducción especializada, análisis, problemas

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Definir en pocas palabras el concepto de traducción científica sería tan difícil como arriesgado, ya que para comprender verdaderamente en qué consiste este campo de especialización de la práctica traductora se deben abordar distintos aspectos que componen su naturaleza. Partiendo de que la propia denominación representa un tema de debate —hay autores que la llaman traducción científica y otros la denominan científico-técnica o científica y técnica—, también existen numerosas dudas sobre qué temáticas o qué tipos de textos abarca este tipo de traducción especializada (hay quien considera la traducción científica como sinónimo de traducción especializada).

Como bien apunta Gamero [1, p. 23] en relación con la traducción técnica, del mismo modo que ocurre con la traducción científica, esta última normalmente se encuentra dentro de lo que llamamos «traducción especializada» junto a otras variedades como la traducción técnica, económica, jurídica, etc. Esta distinción pretende diferenciar dichas variedades de otras que se consideran «no especializadas», como, por ejemplo, la literaria.

Por otro lado también menciona el ya conocido debate que existe también acerca de este aspecto, es decir, sobre si realmente existe una traducción especializada y una traducción general. Por una parte hay quien afirma que la traducción general como tal no existe y «que toda traducción es especializada, puesto que siempre entran en juego conocimientos especiales». En otras palabras, todo texto que se vaya a traducir pertenece a algún campo temático, aunque sea, por ejemplo, literario, lo cual implicará tener ciertos conocimientos sobre el tema (en este caso tener conocimientos sobre el lenguaje literario, sobre la literatura de la época la obra en concreto o incluso sobre el propio autor). Por otro lado, los que sí hacen una distinción afirman automáticamente que existe una traducción general, lo cual, si nos basamos en la práctica profesional, vemos que no existe pero sí que se da en la enseñanza de estudios de traducción.

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Esto sugiere que la diferenciación que existe entre traducción especializada y no especializada en realidad surge del «lenguaje» que utilizan los textos en cuestión, lo cual obliga al traductor a adquirir conocimientos especiales. Veamos a continuación de qué se trata.

A pesar de que en el apartado que hemos dedicado al análisis del texto científico hemos ido comentando las posibles dificultades que se podía encontrar un traductor en dicho texto, en el presente apartado vamos a mencionar los problemas que habitualmente se asocian a la traducción científica a modo de resumen y desde un punto de vista más general.

En primer lugar, como ya es habitual, se nos presentan las dificultades de comprensión del texto generalmente debidas al alto grado de especialización de los términos que aparecen en él. Este tipo de problemática, como ya hemos visto, se puede solucionar con relativa facilidad mediante una búsqueda documental tanto en Internet como en otro tipo de fuente, siendo el primero el método más rápido pero con el que debemos prestar más atención en cuanto a su veracidad. Para ello, debemos asegurarnos de que la fuente (entre otros aspectos) sea fiable, ya sea porque proceda de una institución conocida, como en nuestro caso, o porque los autores que aparecen sean expertos en el tema. En caso de que no encontráramos el equivalente mediante una simple búsqueda existen otras opciones como el uso de foros en comunidades de traductores profesionales o la consulta directa a profesionales expertos en el tema que estamos tratando.

A parte de los problemas de comprensión derivados de la falta de comprensión de la terminología, en el ámbito científico y, en especial, en el ámbito técnico, nos podemos encontrar con abreviaciones o estructuras sintácticas poco elaboradas que dificultan la comprensión de la oración. En ella se ve claramente la falta de estructuras sintácticas claras, con combinaciones que incluyen símbolos, sustantivos y adjetivos que aparentemente no tienen relación entre ellos. La gran dificultad del traductor en este caso, se encuentra en intentar colocar las preposiciones

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correspondientes que le den sentido en español sin que ello implique un cambio en el sentido original.

La solución en casos como este se encuentra, o bien buscando textos paralelos en los que se dé una estructura similar que nos ayude a darle sentido, o a riesgo de cometer un error, hacer una traducción literal para intentar no provocar un cambio de sentido que resulte aún peor. No obstante, como en el caso anterior, también podemos recurrir a un experto en la materia que confirme la validez de dicha traducción.

Paralelamente, otra dificultad de los textos científicos es el uso de símbolos y elementos extralingüísticos que, si bien en muchos casos el carácter universal del lenguaje científico da lugar a que dichos símbolos sean los mismos en ambas lenguas, también puede darse el caso, sobre todo en lo que a las siglas se refiere, de que varíen de una lengua a otra. Un ejemplo de ello lo tenemos en las siglas PCR (del inglés polymerase chain reaction), que en el caso del español se pueden utilizar tanto las mismas siglas como su adaptación al español, RCP (reacción en la cadena de la polimerasa).

El caso anterior nos presenta otra dificultad característica de los textos científicos que es la afluencia terminológica. En el lenguaje científico desafortunadamente conviven muchos términos equivalentes, muchas veces por calco del inglés, ya que la mayoría del conocimiento científico se expresa cada vez más en dicha lengua. No obstante, existen diccionarios como de Navarro [2] que ayudan enormemente a elegir los términos adecuados. Por último, nos encontramos también con problemas no específicos de la traducción científica o especializada, sino que son comunes en cualquier traducción, como errores de comprensión, de expresión y errores ortotipográficos o de puntuación, entre otros. Muchos de los errores que acabamos de mencionar se solucionarían fácilmente si comprobamos y verificamos nuestras traducciones, a ser posible, dejando unas horas e incluso un día de separación, ya que la efectividad de la revisión aumenta cuando no la realizamos en caliente.

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THE ECOLINGUISTIC ASPECTS OF THE LANGUAGE&ENVIRONMENT INTERRELATION

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Abstract: The article deals with the matters of the linguistic diversity and the human and ecosystem relationship. The relevant issues of the linguistic theories and approaches based on the ecological principals are considered. The special attention is given to the linguistic aspects of the language evolution tendencies.

Key words: environment, ecological linguistics, linguistic variety, biological diversity, language ecology, ecological discourse

Nowadays the traditional understanding of ecology as the science of living beings, their interdependence and habitat is not limited only by the scope of biology. In modern ecology sections of science and technology are presented along with the profile of social science disciplines. In this regard, every year there are more facilities, methods and tools for environmental studies, which are borrowed from related fields.

Environmental linguistics or ecolinguistics is one of the modern scientific developments in the field of linguistics, which was formed at the intersection of social, psychological and philosophical trends in linguistics. It should be taken into account that the obvious points of contact ecolinguistics are such

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disciplines as sociolinguistics, speech culture and style. Ecolinguistics was formed to identify laws, principles and rules that are common to both for the environment and for the development of language; it explores the role of language, with the possible solution of environmental problems. The concept of ecology in the linguistic aspect was first used by American linguist Einar Haugen in 1972 [1, 57]. According to E.Haugen, language ecology is the science which is based on the relationship between language and its environment, and the language environment is understood as the society, that uses language as one of its codes [1,325]. E. Haugen's main idea is that languages, like the various species of animals and plants, are in a state of equilibrium, competing with each other, and their very existence depends on each other, both within the state and other social groups, and in the minds of a man who owns several languages. Moreover, E. Haugen noted that the language exists only in the minds of speakers and it functions only under the relationship with the other speakers, and to their social and natural environment. Ecology of language is a part of a physiological nature (that is, the interaction with other languages in the mind of the speaker), partly social (that is, the interaction with the society in which the language is used as a means of communication). Ecology of language depends on people who teach it, use and transfer to others [1,325-327]. Unfortunately, it should be noted that humanity does not equally think about any of the impact of its life on the environment or on the processes occurring in the language environment, which plays a major role in creating an optimal environment for emerging the best of consciousness - with all the consequences [2]. The language environment is a vital prerequisite for the existence of the human species. [3] On the environment, you need to speak the language, using environmental terms and concepts [4]: it can be favorable or unfavorable, and subjected to pollution or experiments. From the linguistic point of view linguistic aggression, linguistic violence

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and criminalization of the language should be studied as well as linguistic self-defense and security.

Traditionally ecolinguistics allocates two directions: "ecological linguistics", which deals with ecology and metaphorically refers to language and linguistics, environmental terminology, principles and research methods; "linguistic ecology", which considers the expression in the language of environmental topics, drawing on linguistics and its methods. Karin Vullenveber notes the following destinations within ecolinguistics. Firstly, it is the environment language, which is the study of the interactions between languages, with particular reference to preserving the wealth of languages (similar to the concepts of "preservation of species richness"). At the moment, three aspects of the ecology of language are intralinguistic (associated with the culture of speech, stylistics, rhetoric, and includes the study of violations of correctness, clarity, consistency, and other expressive communicative properties of speech); interlinguistic (associated with polylinguism as the habitat of certain ethnic language and the problem of the disappearance of languages, and hence a decrease in the linguistic diversity in the world); translinguistic (associated with the use of units of funds, the realities of language, one culture and resources in the context of a language belonging to another culture in literature, folklore, journalism). Secondly, environmental linguistics - a discipline that moves concepts and principles borrowed from ecology to the language. In such way people can study "anthropogenic ecosystems in which focuses people" [5,212-215]. Language ecology studies the relationship between the language and environmental issues related to the environment, for instance, specific environmental discourse involves the study of different texts in order to identify "green" and "non-eco-friendly" elements in the language system. It can be noticed that the basic principles of biological diversity existing in the environment, are also useful for ecolinguistics. They are related to the recognition of the equality principle of the linguistic

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diversity and interaction to the principle of linguistic integrity and unity, which is the key to the ecological thinking, under which a state of human cognition and morality, providing a synthesis of interrelated natural and man-made objects and processes are defined, as a basis for forecasting its development and priority selection of the best environmentally-related solutions and actions. From this point of view, environmental linguistics should study the problem of linguistic diversity.

Language is not considered as an independent system while studying the linguistic diversity issues and relationships between human and ecosystems. Language is considered as a part of the ecosystem, which includes natural and social interaction of human groups and individuals, in which particular linguistic events are formed and developed. Modern scientists point out that it is important not only to preserve biodiversity, but also to maintain cultural and linguistic diversity. Almost every state has specific linguistic ecosystem, so the role of language in the development of new environmental thinking in the narrower sense, i.e., while preserving the environment and in the environmental discourses is of particular importance. According to A. Fill, the categorization of nature from the standpoint of benefit or harm to humans is reflected in many languages. Many linguists give a high assessment of the language opportunities that leads to the conviction of the possibility to solve the fundamental problems of mankind by environmental thinking in the broadest sense. In turn, more significantly developing ecological thinking leads to the new symbols and discursive values. It should be noted that these questions are of a great interest for educating students so as ecolinguistic urgent problems are in practical matters of foreign language teaching.

As noted by K. Vullenveber, ecolinguistics faces the same problems as the environment itself: a complex process, a variety of operating factors unlikely to yield a holistic study, therefore it is necessary to consider the ratio of traditional subjects and disciplines of new directions. Moreover, it is necessary to take

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into account such issues as linguoecological violations at different stages of language development, the deformation of the ecological balance, jargonization of literary language, the role of modern borrowings. Recently, there has been a large number of language elements and vernacular dialect vocabulary. Language becomes easier, and at the same time it loses one of the most important properties - accessibility and intelligibility. Language is a sign of any society at all stages of its existence. Its main purpose is to serve the needs of human society, and to provide communication between the team members. In ecolinguistics language is seen primarily as an open system, which is heavily dependent on the external environment. Thus, language is involved in various aspects of social life, but also society, in turn, has an impact on the language. A large number of modern research in the area of linguoecology are associated with the linguistic influence on the mass consciousness.

Summing up, we can conclude that the relationship between linguistic and biological diversity and their relationship with a particular area may be due to such weighty biogeography factors such as the variety of climates and ecosystems of vast territories; island territories, especially with internal geophysical barriers; tropical climate conducive to the emergence and existence of a greater number and greater density of plant and animal species. All of these factors may also lead to a lot of linguistic diversity through mutual isolation among different ethnic groups and types of people. But, obviously, there are less tangible environmental phenomena affecting this relationship - the process of co-evolution of small groups of people in certain environmental conditions, they tend to adapt to them, and so they have a specific knowledge of these conditions. To impart knowledge about creating the best lifestyle in their own terms, people also develop a certain way of expressing it in the language. In this way, a single language in which this knowledge has been incorporated and transferred can be formed so that it best meets the environmental conditions, where a group of people and their

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needs. Speaking language, which can be viewed as a set of characters that reflect the physical and social environment in which lives a group of people would be more correct to understand the term "environment" both physical and social factors. Under physical environment are understood geographical characteristics such as topography, climate, rainfall, or what may be called the economic base of the region, that is, flora, fauna, mineral resources of the region. Social environment includes such forces that shape the lives and thoughts of the people: religion, ethics, forms of political organizations, art. Based on the foregoing, the influence of these two species on the language can be assumed. Moreover, this issue is relevant today because it is not only related to the question of the role of language in dealing with the environment, because it can become the basis for new pedagogical theories about the formation of the environmental mentality of the new generation.

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REVIEW ON MARK LYNAS'S BOOK 'THE GOD SPECIES' IN TERMS OF TEACHING PROFESSIONALLY ORIENTED LANGUAGE TO ECOLOGICAL FACULTY STUDENTS

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Abstract: The book "The God Species" by Mark Lynas is considered from the point of view of its content and language in terms of using it for teaching the professionally oriented foreign language to the students of ecological faculties. The authors recommend it for both independent and class work.

Key words: teaching, professionally oriented foreign language, student's independent work, work in class

In the recent years, the pattern of curriculum time distribution has changed - there has been a considerable shift towards independent work of students. Therefore, there is a need for appropriate teaching materials that would, on the one hand, encourage student's interest in ecological issues and, on the other hand, help improve and develop their competence in the professionally oriented foreign language. [1]

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Mark Lynas's book, to be reviewed in this article, can serve this purpose in the best way in terms of both its content and language. And we are going to prove it.

Mark Lynas (born 1973) is a British author, journalist and environmental activist who focuses on climate change. He is a contributor to "New Statesman", "The Ecologist", and "Geographical" magazines, and "The Guardian" and "The Observer" newspapers in the UK. He is the author of two previous books: "High Tide: News from a warming world" and "Six Degrees: Our Future on a Hotter Planet", which won the Royal Society Prize for Science Books in 2008. Lynas is a Visiting Research Associate at Oxford University center for the environment. [2]

His last book, "The God Species", appeared to be controversial and inspired much debate. Its critics' opinions varied from highly positive to strongly negative:

- "The book is an absorbing read, but not a comfortable one."
- "It is an insightful, honest book challenging many green movement taboos."
- "Its message is that engineering and investment can keep the planet safe. He has renounced the Green movement and its sacred values."
- It is "a compelling read, a fresh look at some of the most serious environmental challenges." [3, 4, 5]

Regarding the content of the book, "The God Species" covers a wide range of environmental issues and is based on the concept of "planetary boundaries", worked out by the Stockholm Resilience Centre led by Johan Rockström. They identified 9 boundaries: climate change, biodiversity loss, nitrogen cycles, ocean acidification, water consumption, land use, ozone depletion, atmospheric particulate pollution, and chemical pollution. Boundaries are levels of disturbance beyond which humanity should not push within the Earth's system. The boundaries interact and influence each other. [5] According to the

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Group, the first three boundaries have already passed the planet's limit; the next four are still within the guidelines, while the last two have not yet been quantified. [6].

In his book, Mark Lynas has developed this concept. In his opinion, the main tools to achieve sustainability must include new technologies: nuclear power, GM crops and geo-engineering. He says, "The truth of the Anthropocene is that the Earth is far out of balance, and we must help it regain the stability it needs to function as a self-regulating, highly dynamic and complex system.

Nuclear power is environmentally almost completely benign. Properly deployed, nuclear fission is one of the strongest weapons in our armoury against global warming.

The genetic manipulation of plants is powerful technologies that can help humanity limit its environmental impact and feed itself better." [7 pp.10-11]

Thus, it is not surprising that "The God Species" provoked criticism. Moreover, it is worth reading since books of this kind can interest and engage the reader, encourage discussion and arguments, which is essential if we intend to use it for student' independent work. Besides, some passages from the book can be translated and discussed in class. That will help to develop the skills students need to communicate effectively on a variety of environmental topics.

From the linguistic point of view, it should be noted that the language of the book is complicated, rich in scientific terminology, coherent, dynamic, and sometimes emotionally coloured and polemical.

There prevail long complex sentences with various types of subordination and linking. They are always logically arranged and clear cut, for example:

1) Properly deployed, nuclear fission is one of the strongest weapons in our armoury against global warming, and by rejecting it in the past campaigners have unwittingly helped release tens of billions of tonnes of carbon dioxide into the atmosphere as

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planned nuclear plants were replaced by coal from the mid-1970s onwards. [7 p. 10]

2) Mangroves may be valuable as protection against storms and shelter for fish, but someone needs to be paid to look after them if they are not to be chopped down to make way for lucrative shrimp farms. [7 p. 48]

3) One of the most promising ways of doing this is known as 'payments for ecosystem services' - designing revenue streams that go to communities and landowners who need to be persuaded to keep wetlands and forests intact. [7 p.49]

Translating passages from the book students can see how to use a range of complex grammatical structures, such as:

Absolute Nominative construction:

1) Crutzen calculated that up to 40 per cent of ozone could be destroyed in the highest regions of the stratosphere by chlorine-containing CFCs, with the most important ozone-destroying reactions taking place in extremely cold, thin ice clouds high in the springtime polar stratosphere. [7 p.229]

2) And so it proved: in 1985 scientists based at the British Antarctic Survey's Halley Base noticed that stratospheric ozone concentrations were plummeting in the frigid air of the Antarctic spring - with up to 40 per Cent of the ozone layer depleted in a phenomenon quickly dubbed the 'ozone hole'. [7 p.229]

Subjunctive Mood:

To count as offsets, schemes must be additional to what would otherwise have happened, provide benefits that last as long as the damage they are intended to address, and deliver equitable outcomes that bring benefits to local people and communities. [7 p.50]

Complex Subject:

1) Many will find my analysis and conclusions rather unsettling - not least my colleagues in the Green movement, many of whose current preoccupations are shown to be ecologically wrong. [7 p.10]

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2) Scientific analysts quickly warned that it would be unlikely to hold the global temperature rise below 3 or even 4 degrees higher than pre-industrial levels. [7 p.233]

Emphatic constructions:

1) By analogy, had action on ozone required permanently eschewing hairspray - to say nothing of giving up refrigeration - the Montreal Protocol would likely be as stalled and ineffective as Kyoto is today. [7 p.228]

2) Had America backed action on climate as squarely as it tackled the ozone layer, we would be in a very different place today. [7 p.225]

3) Had the pessimists been listened to in 1985, I believe that the ozone layer would still be thinning today. [7 p. 224]

On the whole, translating and analyzing texts from the book students can develop the ability to link ideas effectively using a variety of linking words and phrases. They can learn how to use accurate and appropriate linguistic resources to express complex ideas and produce extensive discourse that is coherent and easy to follow.

Conclusions

1. The book "The God Species" by Mark Lynas can be recommended for students with advanced and upper-intermediate levels of language proficiency.

2. In can be used for the following kinds of work:

- students' independent work (writing an article, an essay, a report or a review, doing written translations)
- work in class (translating and analyzing the linguistic devices applied by the author, discussing various environmental issues considered in the book).

3. Students can make use of the references given in the book if they want a deeper insight into the subjects discussed there.

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TOWARDS SCIENTIFIC-TECHNICAL TEXT METHODOLOGY IN ENVIRONMENTAL STUDIES

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Abstract: The manuscript elaborates on methodological operators of scientific-technical environmental texts. Polytextual hierarchy is established. Various types of operators are defined and analyzed.

Key words: scientific-technical text, methodological operators, intertextuality.

Interdisciplinary approach towards scientific-technical text as a research objective has been justified by cognitive theory, argumentation theory, psychology, science studies, sociolinguistics as well as functional stylistics, text linguistics, discourse theory and genre genesis theory [3, p. 5].

Scientific-technical text is a complex communicative unit that realizes a certain epistemic situation [2] as a combination of certain subject-logical backgrounds, which is considered one of the main problems in modern linguistics.

Scientific-technical text is a complex polytextual system with respect to extralinguistic context specified in the notion of epistemic (cognitive) situation [1]. Development of the new knowledge is determined by the main stages of scientific-cognitive process including explication of a problem, formulating the main idea and the hypothesis, argumentation, affirmation.

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This process of cognition reveals the layout of scientific-research text.

Methodological aspect characterizes cognition by means of information retrieval, development, justification and interpretation. According to E.A. Bazhenova, ontological aspect of scientific-research text is connected with knowledge about the world and methodological aspect is comprised with "knowledge about knowledge" [1, p. 93].

Methodological aspect of epistemic situation is characterized with hierarchal organization with upper layer represented by philosophic methodology as a universal theory aimed at creating a holistic picture of the world. Common methodology as an upper level is a branch of philosophy, philosophic doctrine about methods of cognition and world transformation. The second layer has to deal with general scientific methodology which unites methods, forms and principles of research in different science faculties. The third layer is represented with specific scientific methodology – synergy of research procedures common for various science faculties. The fourth level is comprised with exact research methodologies applied for solving concrete research problems.

Setting goals for methodological aspect is connected with representation of means of retrieval, justification and development of new knowledge. Denotatum includes methodology and mechanisms of cognition [1]. Representation is discrete, explicating cognition and problem solving means based on the new knowledge context [3, p. 53].

Methodological context is a discrete speech structure which connects speech units of different levels which represent the content of methodological aspect of epistemic situation in the context of scientific work.

The context of new knowledge is directly connected to methodological context which is aimed at deliberate categorial conceptualization of research object and subject, explication of perspective and paradigm of reseach objective and its principles.

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Discrete methodological context incrusts the entire text representing information as scientific knowledge as well as ways and means of its retrieval, development and justification of new knowledge.

In environmental studies operators of methodological context include general research lexis, i.e. scientific-philosophical notions which form the basis of any research branch: *shape, element, induction, deduction, substances, materials, system, continuity, regularity, objective, and object.*

Methodological context in environmental studies includes nouns that define basic scientific notions: *theme, operation, concept, idea, problem, hypothesis, analysis, implementation, time, structure, classification, function, first, science, methods, theory, result, study, objectives, look, research, description.*

Operators of methodological context in environmental studies include mental acts of the subject defined by verbs, such as: *imagine, suppose, resolve, believe, think, analyze, estimate, conceive, consider, foresee.*

Methodological context in environmental studies includes verbs that affect the research object: *alter, change, invent, construct, affect, investigate.*

Operators of methodological context in environmental studies include verbs that express actions and states connected with research objective: *use, exist, be, diverge, depend, etc*., they express characteristics and stated of the object.

Operators of methodological context in environmental studies include verbs and their syntactic derivatives denoting mental acts of the subject with respect to the research objective: *research (do the research), define (provide definition), analyzing (doing the analysis), study (conduct the study), describe (provide description) etc.;* attributive word collocations of methodological nature: *the main features, functional characteristics, complex analysis.*

Stereotypical operators of methodological context in environmental studies include scientific vocabulary representing

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the concept of "research objective": *the study conducted for the purpose, the paper aims, the objective of the research as a contribution to the study, the purpose of this paper.*

Stereotypical operators of methodological context in environmental studies include scientific vocabulary representing the concept of "results, conclusion": *the main findings are summarized, based on the results it can be concluded, reported results indicate, determined that, to conclude, in conclusion, is appropriate to discuss these findings, we conclude that, the results lead us, with the base of the results obtained prove the findings.*

Thus the structure of methodological subject is realized by means of speech units of different levels including words (*element, form*), word collocations (*study – conduct the study, analysis – do the analysis),* sentences and chunks (*the purpose of this paper)* separately, without any formal connection. These units are linked by semantic and functional similarity and are incrusted thoughout the entire text [4, p. 81].

General scientific vocabulary using traditional word formation models develops the sphere of general scientific knowledge representation and provides terminology for various branches of science and technology: *concept, conception, conceptual, conceptualize, conceptualization; relationship, relate, relative, relativity; apply, application, apply, applicability; atom, atomic, atomicity; complement, complementary, complementarity; factor, feasible, feasibility; atom, atomic, atomicity.*

Methodological context in environmental studies performs an important communicative function, its operators incrust the entire textual structure, act as meaningful milestones on the path from ignorance to knowledge. This function of methodological context is especially acute for speech representation problem solving that requires explication of procedures and strategies of argumentation, explanations, results, procedures on notion validation and development.

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The context of new knowledge and methodological context represent the upper level in polytextual hierarchy, are the main components of compositional-semantic structure of a scientific text.

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