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В работе конференции принимали участие ученые, аспиранты, магистранты и студенты российских и зарубежных вузов, сотрудники научно-исследовательских учреждений и производственных предприятий.

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1. ECOLOGY AND BIOSYSTEMS

Baranova Y.A.[1], Golubeva M.V.[2], Baeva Y.I.[3], Kulakova N.U.[4]

ASSESSMENT AND FORECAST FOR THE PEDUNCULATE OAK CONDITION IN A METROPOLIS

Russia, Moscow
[1]Master's student, Ecological Faculty
kirsche24@yandex.ru
[2]Master's student, Ecological Faculty
bleckCat2007@yandex.ru
[3]Candidate of Biological Sciences, Associate Professor, Ecological Faculty
RUDN University, Moscow
baeva_yulya@mail.ru
[4]Candidate of Biological Sciences, Senior Researcher, Institute of Forest Science, RAS
nkulakova@mail.ru

Abstract: Assessment and forecast for the condition of the pedunculate oak is a crucial issue today due to the fact that stands of oak trees in the Moscow region can be found much less frequently than stands with predominance of other species, but they are very promising for cultivation.

Key words: urban forests, environment, oak, objective, assessment and forecast, pedunculate oak.

Urban forests play an important role in creation and preservation of the environment, reduce the impact of negative factors which affect residents and the environment by 45% [1].

Assessment and forecast for the condition of the pedunculate oak is a crucial issue today due to the fact that stands of oak trees in the Moscow region can be found much less frequently than stands with predominance of other species, but they are very promising for cultivation.

The objective of the research is to study the mechanisms of adaptation of the oak to the pollution in the Moscow region metropolis.

The research program is designed for 3 years. During this period about 8 stands with predominance of the English oak located in different areas of the Moscow region will be observed.

To study the pedunculate oak, the following methods and approaches are used: ecomorphological, cytogenetic, biochemical methods and a biogeocenotic approach [2].

At the first stage (2016) the seasonal dynamics of the content of water-soluble carbohydrates and concentrations of heavy metals in the branches and leaves of the oak were analyzed. The observed trees are of an extremely old generative ontogenetic state with a spreading crown type. The selection of material was carried out in two places (6 trees): in the first case, the trees grew 2-3 meters from the main road (Svobody avenue, 55˚75'e.l.; 37˚82'n.l.), In the second case - about 210 meters from the highway (Terletskii park 55˚77'e.l.; 37˚82'n.l.).

Sampling took place in March, May and July 2016. In March only branches were collected, in May and July - branches and leaves.

According to the analysis, we note that the areas differ significantly in entering pollutants [3, 4]. In general, within one winter month sodium intake in the first group was 7 times higher than in the second one, and calcium chloride - 4 times higher, and sulphates of lead - up to 2 times, zinc - 1.5 times higher than in the second group, made up of 192 ± 26; 219 ± 34; 504 ± 87; 213 ± 52; 0,19 ± 0,14; 1,3 ± 0,61mg / m2.

Definitely, the flow of the volatile components of pollutants was roughly proportional to the amount of heavy metals accumulated in the snowpack.

The lead concentration in leaves and branches ranged from 0.2 to 0.4 micrograms / mg of dry material, of zinc from 1.2 to 2.7. The average concentrations of lead and zinc in the leaves and branches of trees on two sites did not differ much [4]. The analysis of the content of heavy metals in plant samples was conducted on an atomic absorption spectrometer.

When collecting samples at the end of July differences in the visual condition of trees were marked in two areas: in the first group of the oaks there was leaf necrosis of various degrees, which was not observed in oaks in Terletskiy Park. We can assume that this is due to the constant stream of cars moving near the first group of trees, in contrast to the trees that are in the park, away from the road.

The content of water-soluble carbohydrates during the growing season (until September 2016) was consistently high and did not differ in two areas. The primary difference between the groups was associated with the ratio of carbohydrate fractions. In the first group, with increased pollution from motor vehicles in March, before leafing, and in May, after the development of a lamina, the ratio of monosaccharides and disaccharides was lower by 4-5 times than that of trees in the park. This pattern was also observed in July, but was not confirmed statistically.

Old-growth oaks with well-developed crowns have great potential to adapt to the conditions of pollution from road transport. One of the mechanisms of adaptation is an increase in the content of disaccharide fraction [5].

For more precise findings annual sampling should be completed, i.e. samples after the growing season should be collected to do experiments and compare all the results.

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Bortsova E.V.

ADVANTAGES AND DISADVANTAGES OF WIND POWER

Russia,
Bachelor's student, Ecological Faculty
RUDN University, Moscow
borczowa.lena@yandex.ru

Abstract: This article provides information on the volume of energy produced by the wind over the past 15 years, the advantages and disadvantages of wind energy, and recommendations on the choice of areas to accommodate wind power.

Key words: the impact of accidents on the environment and livelihoods of the population, air and water pollution, global warming, an intense noise, wind turbines, the powerful wind farm.

Every year, the human needs for mineral resources is increasingly growing, in this regard, many fields to the nearest time will be exhausted. It is therefore necessary to reflect on the broader use of alternative energy sources.

One of the most promising sources of alternative energy is wind. Every year the volume of electricity generated by wind increased (Chart 1)[1].

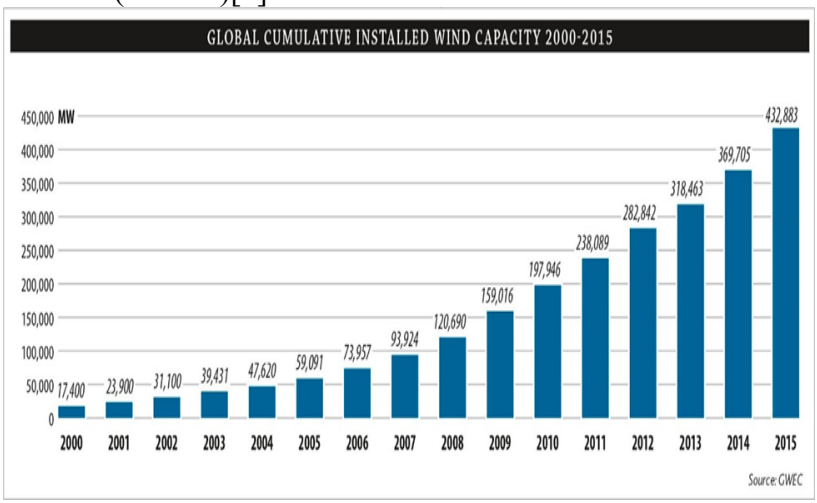

Chart 1. Global Cumulative Installed Capacity 2000-2015

The main advantage of wind energy is the impact of accidents on the environment and livelihoods of the population. Under no circumstances and natural disasters, accidents at WPP may not cause man-made disaster. Whereas the accident at the NPP with the release of radioactive substances, it is a real danger, with catastrophic consequences[2, p. 215].

Also prevents wind energy:

• invasion of the habitat during the construction of mines, drilling, laying of pipeline systems;

• air and water pollution: acid rain, smog, heavy metals, dirty water during drilling;

• Global warming due to the burning of fuel used and emissions of carbon dioxide;

• thermal water pollution (discharge of cooling water from nuclear and thermal power plants);

• flooding areas and river flow regime change in large hydropower[2, p. 216].

But there is a negative impact of wind turbines on human health and environment.

Firstly, their work adversely affect the operation of the television network[3, p. 85].

Secondly, there is an intense noise that adversely affects the living organisms, causing permanent depression, severe anxiety and wanton living uncomfortable when working wind turbines[3, p. 85].

However, the main disadvantage of this type of energy, together with the variability of wind speed - it is a low intensity that requires a large area to accommodate the installation of wind[3, p. 87].

Therefore, when choosing the territory to accommodate the powerful wind farm should consider:

1. the need for careful choosing a site for it, that is, the use of land unsuitable for agricultural use;

2. opportunity of construction of less powerful wind farms to power a small neighborhood or village[4, p. 113].

The development of such plants can be useful for power remote towns and villages, as well as various agricultural operations[4, p. 113].

It should have high power wind turbines at a distance of 250 meters from the place of permanent stay of people. In this case the noise level is usually less than 45 dB. It is acceptable for the life of the people and the system meets safety standards and sanitary norms[4, p. 115].

Thus, wind turbines for power generation do not pollute nor air, nor water, nor earth, and do not produce hazardous wastes. They do not deplete natural resources such as coal, oil, natural gas and not cause environmental pollution, which occurs during the production and transportation of fuel, and wind turbines do not have any negative impact on humans and the environment when properly placed in the territory.

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Cherepenina D.A.

LICHEN-INDICATION IS A SPECIAL CASE OF BIO-INDICATION

Bachelor's student, Ecological Faculty
RUDN University, Moscow
diana0075@mail.ru

Abstract: The article contains the basic properties of lichens as bio-indicators. The article deals with methods of lichen-indication. The problem of anthropogenic pollution of the environment is considered.

Key words: lichens, lichen-indication, bio-indication, bio-indicator, contamination

Introduction. Nowadays people intensively modifies the environment because they deforest, plow up steppes and develop new deposits and contaminate components of the ecosystem emissions of industry and transport. This human activity disrupts the habitat of the living organisms. It is widely known that anthropogenic pollution of the environment is one of the most important anthropogenic factors that affect the biota state. Thus to assess environmental quality and trends in the components are used certain types of biota. This method is called by the bio-indication. Due to lichen-indication is a type of bio-indication, in this case lichens are bio-indicators of the environment. Lichen-indication is method of monitoring of environmental pollution, mainly air by using lichens. Lichen is a symbiotic organism, consisting at least of two partners: phototrophic algae or cyanobacteria (photobiont) and fungus (mycobiont) [1].

Lichens as bio-indicator are used almost all over the world, as they have a number of properties:

1. Lichens absorb water precipitation, fog, dew, together with dissolved substances, then these substances accumulate in their thallus, therefore, the content of pollutants in the thallus reflects their concentration in the air.

2. If one of the symbionts is damaged, the lichen dies, so they are very sensitive to various environmental changes, especially air pollution, as chemical compounds destroy the chlorophyll of the photobiont and inhibit the process of photosynthesis.

3. Lichens have a low variability, which allows to identify the impacts that are connected with changes in the environment.

4. Metabolism of lichens occurs in all seasons, consequently their condition can be observed all year round.

5. Lichens are widespread in all regions of the Earth.

The sensitivity of lichen species is determined by the area of the absorbing surface. As a result, bushy forms of lichens are more sensitive to environmental pollution, and less – scale (cortical). Furthermore, there are a number of morphological and biochemical defense mechanisms, for example, the density of the cortex, the high buffer capacity of the cell, the presence of secondary metabolites and the ability to enzymatic detoxification of polluting substances that contribute to the sustainability of certain species [1]. Due to the development of adaptive mechanisms led to the appearance of lichens that are rare in areas where there is air pollution at the ambient level, for example, *Lecanora conizaeoides* [2]. Moreover, the sensitivity of the species depends on environmental factors and the type of contamination. It turns out that the species that grows on areas with high relative humidity are less stable, the same species growing in dry areas. Also the kind that lives on the bark of coniferous trees more resistant to lixivial contamination, than the same species on the bark of broad-leaved trees. Because lichens living on acidic substrate more sustainable to lixivial contamination, than the same lichens that are growing on an lixivial substrate and vice versa. Thus, the bark of coniferous species has pH < 7, i.e. acidic, and broad-leaved - pH < 7 (lixivial).

Lichenologists have created regional scale the sustainability of the species on the basis of the existence of individual resistance of lichen species to pollutants. The creation of these scales has allowed to correlate the presence of specific lichen species to air pollution in the city area. For this assessment map territory, dividing into squares of equal size, and survey in the center or at the corners of each square lichens-epiphytes, i.e. lichens growing on the bark of trees [1, 3]. Usually survey the epiphytic lichens on a single tree species or trees with similar bark properties, just for the upright trees of a similar age, that grow in roughly the same conditions. It is possible to consider as a set of species so the occurrence and cover of each species. Furthermore, sometimes consider the viability of species or compare the intensity of photobiont, membrane permeability, amount of toxic elements in the thallus [3, 4].

In addition, determine the concentration of metals in the thallus of lichens using atomic adsorption spectrometry for definition of metal emissions to the atmosphere. Besides the thallus of lichens from "clean" areas can be transplanted into contaminated, and then to assess the extent of damage after a certain exposure time, that is, in this approach, are studying the effects of pollutants on lichens [4]. However, the need to place the thallus in the same microclimatic and ecological conditions: for the same tree species, height on the stem and oriented in the same cardinal point. Also, the control the thallus transplanting but only the same "clean" the region to eliminate the errors associated with the possible impact of transplantation.

In conclusion. Methods of lichen-indication are used not only to estimate air pollution, but to assess the state of ecosystem: deforestation old forests lead to the disappearance of a number of specific lichen species, agricultural activities contribute to the different successions of lichen communities, to estimate the impact of global warming on lichens.

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Khokhlova A.A.

EUROPEAN BEAVER (CASTOR FIBER) IN THE NATURAL-HISTORICAL PARK "POKROVSKOE-STRESHNEVO" (MOSCOW)

Master's students of the department of System Ecology, Ecological faculty
RUDN University, Moscow
annushka279@mail.ru

Abstract: the study is devoted to monitoring the vital functions of the European beaver in metropolis conditions, in order to assess the anthropogenic pressure it is exposed to in a metropolis.

Key words: monitoring, European beaver, settlement, metropolis, anthropogenic pressure, semi-aquatic, edificatory.

There is a big settlement of beavers (more than 6 individuals) in Moscow's Pokrovskoe-Streshnevo Park on the river Khimki originating from the Khimki reservoir [1]. Beavers have long attracted people as amazing animals that build elaborated hydrotechnological facilities, such as lodges, dams, canals; they fell trees, store food for the winter, take care of their family, their offsprings[2]. It is particularly noteworthy that beavers live within the boundaries of the metropolis and are regularly exposed to strong anthropogenic pressures. The relevance of the work is in the fact that wild animals live within a metropolis. The study is an ongoing monitoring of the beaver settlement (about a year) for relationship between beavers and other inhabitants of the river, as well as anthropogenic factors. Thus, the purpose of this work is to study a settlement of the European beaver located in Moscow and assess the anthropogenic pressure it is exposed to in the metropolis.

The study has been carried out on the territory of the monument of nature "The Valley of the River Khimki". The length of the river is about 18 km below the dam of the Khimki reservoir, the river is fed by the springs of Pokrovskoe-Streshnevo Park. The nature monument was established in 1991, its area is 15.2 acres. There are alder forests as well as fragments of meadows and lowland swamps in the floodplain of the river Khimki. A beaver dam with a length of about 7 meters is located downstream. There grow such plants from the Red book of Moscow as ostrich fern, May lily, yellow anemone, corydalis, water forgeron, great bellflower and nettle-leaved bellflower. It is also a habitat for some bird species that are rare in Moscow: red-headed and tufted duck, hobby, moorhen, crow, long-tailed tit [1].

The object of the study

European beaver (Castor fiber L.) belongs to the order of rodents. [3]

It is a semi-aquatic, exclusively herbivorous animal that rarely moves away from the pond to a distance of 100 m. The length of the body is 75-120 cm; the weight is 20-30 kg. [4] The fur is made of long coarse guard hair and a soft wavy underfur, the color is from light brown to black. Beavers are common in the boreal part of Eurasia from the Atlantic coast to the Baikal region and Mongolia (acclimatized in Primorye and Kamchatka). It inhabits coasts of small ponds, slowly flowing rivers, lakes, ponds, reservoirs, irrigation canals and quarries. [3] It lives mostly in families. A full family consists of a couple of adults and some youngsters born in the past and current years. Its lodge has a complex structure, inlets are always under water. Beavers build lodges on low swampy shores and shallows, they are cone-shaped piles of twigs, sealed with mud, their height is 1-3 m and diameter is 10 m [5].

Families of beavers build dams below the settlements in order to maintain the water level in the reservoir. Adam consists of pieces of cut tree trunks, branches, twigs, held together by clay, silt [4]. Beavers are guided by the sense of smell and mark their territory by the secret of musk glands called castoreum [6].

Beavers eat bark, thin branches of trees, leaves, preferring aspen, willow, birch, water, and riparian herbaceous plants [3,4]. In autumn they fell trees gnawing the bottom of the trunk, then they separate the branches and the trunk, and cut the trunk into pieces for easier transportation [5]. Beavers are active at night and at dusk in summer, in winter their activity decreases and shifts to the daytime [3].

Their breeding season lasts from the mid-January until the end of February. Cubs are born in April – May. Sexual maturity is reached in the second or third year of life [5].

Beaver provides valuable fur and beaver stream used in perfumery and medicine. Its meat is used for food. Because of

intensive hunting it was on the brink of extinction. European beaver is saved in national parks, from which it is artificially resettled to the places of their former habitation [3].

Methods of research

Monitoring is conducted once a week for 2-4 hours in the evening, time is determined by beaver's daily activity [2]. Thus, the method involves observation and analysis of the results obtained. Beavers have been observed since July, and we plan to monitor them until next April. All their activities, periods of activity, quantity of eaten or stored food, their habits, the relationship between themselves and other inhabitants of the river such as ducks, muskrats, water voles, rats, as well as the effect of anthropogenic factors are recorded.

During the monitoring period we have mapped the territory of the river, determined the species composition of plants – raspberries (Rúbus idáeus), black alder (Álnus glutinósa), Siberian larch (Lárix sibírica), birch (Bétula péndula), white willow (Sálix álba), crack willow (Sálix fragílis), etc. We have also revealed what plant foods beavers prefer: aspen, willow, raspberry, sedge, wormwood.

Beavers live in Moscow on the outskirts of the Park in a few meters from the road and brick buildings. Beavers are edificators, so in the middle of the river, where most of their activities take place, there are a lot of moves and dams. 2-3 individuals from the whole family are not afraid to get closer to people. Beavers carry into their huts larger parts of the apples and other fruit and vegetables that people throw into the water. While smaller parts are eaten by them on the spot, while swimming in shallow waters. They often mark their territory with odorous beaver stream, alerting other animals of the Park.

The settlement of beavers attracts a lot of people whatever the weather.

Conclusions

— At least seven individuals of European beaver live in the park Pokrovskoe-Streshnevo in Moscow.

— The list of plant species eaten by beavers in the northwest of Moscow, is common in comparison with the spectrum of the same species of beavers living in more natural conditions.

— Beavers' spatial activity are mainly concentrated in a radius of 20 m from the hut, but during their feed of banks they are moving away from the water's edge up to 40 meters from the hut and in the water up to 300 meters.

— The biogeocenotic role of the beaver as an edificator of the Himka river is enormous. With increase in the area of the water surface of the river, the relative number of types of the live organisms entering with beavers one ecosystem has increased.

— The manifestation of human impact on the park is very big, but there are no negative effects of human activities on the beavers.

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Kosyakova A.Y.

ROAD MORTALITY OF REPTILES IN THE NATIONAL PARK MESHERA CONCERING ITS RYAZAN REGION PART

Head of the Department of Science
National Park Meshera, Spas-Klepiki
ainsel@list.ru

Abstract: We investigated reptiles mortality on roads in 2015-2016 on 3 roads passing through the coniferous and mixed forests of the National Park Meshera. Special attention was paid to the Anguis fragilis death, rare species of Ryazan region.

Keywords: road mortality; reptiles; *Anguis fragilis*.

Introduction

The negative effect of roads especially death from vehicles was investigated for reptiles in different areas [2, 5, 6]. This problem exists on the roads in the areas where special measures are taken for the protection of nature [3, 5]. There are 6 species of repliles on the territory of the National Park Meshera [1]. Two of them (*Anguis fragilis* and *Coronella austriaca)* are the rare ones, protected species [4]. The aim of the present research was to give

some preliminary information on the mortality of reptiles on the forest roads of the National Park Meshera.

Materials and methods

Fieldwork was conducted in the forests of the National Park Meshera (Ryazan region part) within especially protected zone during May 2015-2016.

We recorded the number of reptiles that had been crushed on 3 roads passing through the coniferous and mixed forests:

1. the forest sandy road connecting villages of Grishino and Krasnyj Jar (9 km);

2. the forest sandy road connecting villages of Grishino and Juvino (6 km);

3. the forest paved road (9 km).

Roads №1 and №2 run through a pine forest along the right and left banks of the Pra River. Road №3 crosses the mixed forest. It includes two sections made of asphalt (about 2 km) and crushed stone (about 7 km).

Strictly regulated attendance is permitted in the especially protected zone. The local population and tourists use the roads to move to the places of residence and recreation.

Counting of the dead reptiles was made once on each route in the first decade of May. It was in 2015 on roads №1 and №2, in 2016 on all three routes.

In addition, separate meetings of dead reptiles are recorded during the entire season from 2010 on the roads of the National Park.

Results

Four species of reptiles have been found during investigation, one of them *Anguis fragilis* is a rare one for Ryazan region [4].

Anguis fragilis is Presented into Red Data Book of Ryazan region [4]. Within the national park the species are distributed sporadically, have a small number [1]. Found annually in the investigated areas. In 2010 four dead slow-worms were recorded on the territory of the National Park. Three of them were found

on road №3 in May, one was found on road №1 in July [3]. During the observations in 2015 on the both forest sandy roads №1 and №2 *Anguis fragilis* were found, with a total of 9 specimens. In 2016 the number of lizards killed by cars was 3 specimens.

Lacerta agilis. The species is common for the territory [1]. It was noticed on all routes. One specimen was crushed on road №3 (9 km).

Vipera berus. Common for the territory [1]. Dead specimens are recorded every year from spring to autumn on all routes. In May 2016 one crushed *Vipera berus* was recorded on a route length of 9 km in the mixed forest (road №3).

Natrix natrix. Common for the territory [1]. Dead specimens were recorded every year from spring to autumn on all routes. 10 specimens were found crushed in the mixed forest on the rout length 9 km (road №3) in May 2016.

Discussion

Every year reptiles are killed by cars on the roads of the National Park Meshera, including the roads crossing the especially protected zone of the National Park, where a strictly regulated attendance is permitted. A special attention should be paid to cases of death of *Anguis fragilis*, which are presented in the Red Data Book of the Ryazan region [4]. So in early May 2015 9 crushed *Anguis fragilis* was found on routes with a total length of 15 km. It should be noted, hat are most susceptible to the death of sexually mature females, due to their greater need for warmth during the gestation of offspring. A road is a place of animal warming [2].

The theme of death of reptiles requires additional researches. Some additional measures should be undertaken in order that to protect reptiles in the National Park. In particular declines of motor-car traffic on forest roads. Another problem is intentional elimination of reptiles, especially snakes and lizards that look like snakes by the people [5]. So it’s necessary to work out the effective system of the ecological inlightening of

population, make information about reptiles inhabiting the national park territory more availability.

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Kurmanova A.Y.

INTERDISCIPLINARY APPROACH TO THE STUDY OF HONEY

Russia
Postgraduate student,
Kovalenko State Research Institute of Experimental Veterinary (VIEV)
kurmanayana@gmail.com

Abstract: History, philosophy and methodology of the research using the system approach and information technologies help to organize the knowledge and application of honey and other products.

Key words: Bible, concept, ecology, honey, nutrition, ontology, relations, system approach

Introduction**.** Nutrition is any organism's need and a key factor in the environment. Trophic relationships enable ecological-genetic system experiments and practical applications in various fields [1]. Honey, a product of honeybees has the nutritional value for many species, including humans.

However, the contraindications to the use of honey and many other natural products are increasing. The environmental and health problems require a multidisciplinary system approach in their solution. Thus, we need to develop a philosophical and methodological part of the study considering its history since the ancient times.

Such concepts as "right-wrong", "positive-negative", "healthy-unhealthy" etc. can compromise the experiment and its results, if not clearly defined at the very beginning of the study. This requires an analysis of the concept (greek - logo), in our case, of honey.

Methodology**.** In exploring concepts we find it useful to appeal to biblical texts. The Bible speaks about all the phenomena of society and nature in the context of their relation to the Creator's commandments and splits them into "right/wrong", "pure/impure", "redeemed/yet not redeemed" [2]. This includes also nutrition.

The key role of relation issues in the Bible emphasizes the similarity of this book with ecology – a science about the relations of organisms with each other and with the environment. The Bible reveals patterns of human relationship with God, self, others, the rest of the living world and material wealth [3], demonstrating the interdisciplinary and system approach.

To analyze the word "honey" in the Bible we used Android Scripture applications developed by Life.Church and MartinVillar.com groups. The search engine of system showed more than 50 quotes about honey.

Results**.** Honey is shown in two ways (Table 1): literally, as a physical stuff, and figuratively, as the allegory of intangible phenomena. Each meaning splits in two: a product and an attribute of healthy (promised) land; knowledge and relationship. Each option has two ways to obtain, use or treat - positive and negative, eight classes in general, with some subclasses.

Table 1.

Honey meaning in the Bible.

Literal				Allegorical			
Product		Land's attribute		Knowledge		Relationship	
+	-	+	-	+	-	+	-

Found information offers a way to study the ontology of honey, medicines and other biologically active stuff. The initial stage of research implies also experiments in vivo and in vitro, to test the method.

For this goal it is proposed to use the resources of the Russian specialized collection of permanent cell lines of invertebrates created by Professor V. Kakpakov (1937-2012) (intl.code – WIEW) that contains 20 lines from six species. The information is presented in the International "Human and animal cell lines catalogue" (Interlab project, 1993) and in the

International World Federation of Culture Collections database [4].

For example, the study of honey from the Altai Republic showed that smaller concentrations (0.0001%) in the medium better stimulate the growth and reproduction of Sf9k cell culture than max concentration 0.1% [5]. This approves that honey is rather a pharmaceutical product requiring small doses of consumption than food. Also the Bible Proverbs recommend (24:13), but warn: “It is not good to eat too much honey” (25:27) [6].

Conclusion. Further development of the research method, considering the trophic relations of the organisms may help for the tasks of nutrigenomics and healthy nutrition and open up a new field in epigenetics [1] – “a new science with foundational meaning for biology”.

Perhaps in the future, instead of expensive and ethically questionable experiments, we will be able to do information analysis to determine the types of substances that are suitable or not, for the animal or human individual.

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Rivas Bonilla Mara-Andrea[1], Tijerina-Borisenko Janet[2] Borisenko Elena[3]

MEDIDAS TOMADAS CONTRA EL CAMBIO CLIMÁTICO COP21

[1]Máster en Relaciones Internacionales, Universidad Autónoma Metropolitana –Unidad Xochimilco
[2]Estudiante de Doctorado, Facultad de Ecología, RUDN University
[3]Profesora de Centro de Enseñanza de Lenguas Extranjeras, Villahermosa City, Tabasco, México
marassun1@hotmail.com[1], larusa12@hotmail.com[2]

ACTIONS TAKEN AGAINST CLIMATE CHANGE

Abstract: Stopping the change climate is the biggest challenge we face in this century. The COP21 showed the commitment of governments to maintain the global temperature.

Key words: Conference of the Parties, legally binding agreement.
Resumen: Frenar el cambio climático es el principal reto que tenemos que enfrentar en este siglo. La COP21 mostró el compromiso de gobiernos mantener la temperatura global.

Palabras clave: Conferencia de las Partes, Acuerdo jurídicamente vinculante.

Introducción**.** La humanidad se enfrenta al cambio climático. Recientemente se ha visto la gran relevancia de este

tema ya que hoy en día no pudieron frenar los procesos iniciados. En los últimos años los acontecimientos globales han hecho aumentar la preocupación de los investigadores y los gobiernos que realizaron un gran número de estudios y reuniones a nivel mundial para tomar las medidas al respecto. El propósito principal de la investigación de este artículo es determinar las medidas tomadas para combatir este fenómeno planetario.

Como método principal fue usado el método de triangulación de toda la información teórica y empírica sobre el tema.

A base de observaciones de eventos estatales a nivel mundial con respecto al fenómeno, en el presente artículo fueron recogidos y estudiados los más cruciales para la resolución del problema.

1. La Convención Marco de las Naciones Unidas sobre el Cambio Climático ratificada por 196 Estados (entró en vigor el 21 de marzo de 1994) reconoció la existencia del cambio climático debido a la actividad humana y se atribuyó a los países industrializados la responsabilidad principal de luchar contra este fenómeno. La Conferencia de las Partes (COP), compuesta por todos los Estados "Partes", constituye el órgano supremo de la Convención Marco, y se reúne anualmente en conferencias mundiales. Las decisiones solo se pueden tomar por unanimidad de las Partes o por consenso [1, p.4].

2. El 12 de diciembre de 2015 se suscribió el Acuerdo de París que estará abierto para su firma entre el 22 de abril de 2016 y el 21 de mayo de 2017; entrará en vigor cuando al menos 55 partes, que sumen en total el 55% de las emisiones globales, lo hayan ratificado [1].

Los principales puntos [2]:

- La temperatura global debe estar por debajo de los 2°C o menos para antes del 2100. Incluye Estados Unidos de América, la Unión Europea, China, la India y países petroleros.
- Acuerdo jurídicamente vinculante para los países firmantes.

- Se establece el principio de las "responsabilidades compartidas pero diferenciadas".
- Los países desarrollados apoyarán financieramente a los países en desarrollo con 100.000 millones de dólares anuales a partir del 2020, de acuerdo al compromiso asumido en la COP16 de Cancún.
- Comunicar cada 5 años sus contribuciones nacionales en cuanto a la reducción de emisiones globales.

En la COP 21 había un acercamiento de las dos principales naciones que contaminan a nivel mundial: China y Estados Unidos de América que representan el 44% de las emisiones de CO2 a nivel mundial desde el año 2013 [3, p.7]. Los años siguientes son fundamentales para el cumplimiento de lo acordado; se deberán identificar oportunidades, así como valorar los costos [4, p.17].

Conclusión. Es importante la voluntad política de los países para realizar el trabajo en conjunto que lleve a concretar las acciones que corresponden a la medición, control y reducción de gases de efecto invernadero [5] porque el problema ya no es local sino global: se derriten los glaciares, sube el nivel de mar y el aire ya está tan contaminado que el porcentaje de luz solar que llega a la superficie de la tierra bajó drásticamente los últimos años a nivel mundial.

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Popkova A.V.

BIOTECHNOLOGICAL POTENTIAL OF CAVE MICROBIOTA

Post-graduate student of the Department of Environmental monitoring and forecasting, Ecological Faculty
RUDN University, Moscow
popkova_av@mail.ru

Abstract: Caves are considered extreme habitats with interesting species biodiversity, which can be a potential source of bioactive compounds. antibacterial activity of Cyanobacteria from cave scrapped biofilms has been established. Caves may be a source of valuable bio-products in future.

Key words: cave microbiota, antibacterial activity, biotechnology

Introduction**.** Caves represent worldwide a very specific environment, which is characterized by almost constant temperature and relative humidity all year round. Cave microbiota have been studied in Slovenia, Serbia, Greece, Spain, Canada, North America [2, 3, 4, 6, 8, 9]. Today scientists tend to believe that cave habitats are extreme because of low nutrient input and light intensity [1]. As a consequence, microorganisms forming biofilms in these conditions have been recently identified as a good source of bioactive compounds for different

biotechnological applications [3, 7]. Many microorganisms from various biotopes e.g. marine [12], freshwater [5] and soil [11] have been tested for antibacterial, antiviral, anti-thrombotic and also anticancer effectiveness.

However, beyond taxonomy, biotechnological studies of cave microorganisms are rare. The present study is focused on review of experiments dedicated to antibacterial effectiveness of cave algae and bacteria [3, 7, 10].

Methods**.** Scrapped biofilms from caves were used for experiment. Enrichment cultures were obtained in flasks and Petri dishes with culture media. The potential antibacterial activity against clinical and reference bacteria *Staphylococcus aureus*, *Enterococcus faecalis* was tested by the disk diffusion method [4]. The cross-streak assay method was used to examine the antimicrobial activity of cave isolates against various tested microorganisms [7]. A 'modified cross streak method' [10] to quantitatively evaluate the effect of actinobacterial isolates against a number of pathogens was proposed.

Results and Discussion**.** Antibacterial activity of Cyanobacteria against the Gram-positive clinical and reference bacteria has been shown, mostly pronounced in enterococci; no activity was observed against the Gram-negative bacteria.

Cave extreme habitat experiences steady or fluctuating exposure to one or more environmental factors, i.e. salinity, desiccation, solar irradiance, pH, temperature, nutrient limitation, that's why it is considered as one of the most promising sources of biotechnologically useful compounds.

Exploitation of new natural products as antibacterial agents against resistant pathogens is very important for clinical medicine. However, no studies have yet identified the biotechnological potential of microbial isolates from caves. It is obvious that caves are relatively underexploited in time when the microorganisms that inhabit these ecosystems may produce secondary metabolites that can be of value to humans.

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Zheleznova O.S.[1], Chernykh N.A.[2], Tobratov S.A.[3]

RETRANSLOCATION OF FOLIAR HEAVY METALS (CU, ZN, CD) IN TREE SPECIES DURING AUTUMNAL LEAF SENESCENCE (EXAMPLE OF SUBTAIGA FORESTS OF THE EAST EUROPEAN PLAIN)

[1] Postgraduate of Ecological Faculty; RUDN University, Moscow;
zheleznova_rzn@mail.ru
[2]Doctor of biological sciences; RUDN University, Moscow;
natchernykh63@mail.ru
[2]Doctor of biological sciences; Ryazan State University named for S.A.Yesenin, Ryazan;
tobratovsa@mail.ru

Abstract: In this work the results of study of heavy metals retranslocation from tree species leaves during autumnal senescence are presented. It has been shown that there are two factors influencing on retranslocation: the nature of chemical element and tree species traits. It has been found that the common tendency was the autumnal withdrawal of Cu from aging leaves and accumulation of Zn involved in nitrogen catabolism enzymes synthesis. The portion of toxic Cd retranslocated from the leaves differs greatly among the species.

Keywords: tree species; retranslocation efficiency; heavy metals; nitrogen catabolism; leaf senescence.

Introduction

Circulation of mineral elements is the most important characteristic of ecosystem. One of the substantial parts of circulation - nutrient retranslocation from aging photosynthetic organs of perennial species. It is the key process defining the fate of the leaf nutrients [1]. The balance between nutrient recycling in the plant and its return to the soil through the litter influences on chemical load on the ecosystem.

Besides importance on the ecosystem level the retranslocation process is also important on the population and species levels determining the special traits of perennial plant functioning. Nutrient retranslocation from the tree and bush leaves to their stems, branches and roots allows to avoid fluctuation in the soil bioavailability of elements [2]. Thus, in spring remobilization of nutrients from storage organs can lead to comparatively early regrowth of foliage, even before the start of nutrient uptake from the soil [1].

Leaf nutrient retranslocation has been remarkably well studied in the past four decades. It should be noted that the main objects of studies in the earlier works as well as in modern ones are, as a rule, nitrogen and phosphorus which are the main elements limiting plant growth in the broad range of environmental conditions [3]. At the same time microelement retranslocation from leaves got much lesser attention [4].

In general nutrient retranslocation from senescing leaves depends on three main factors: the nature of element, its deficit or excess in nutritional medium and plant species traits [4; 5]. The influence of two last factors on nutrient retranslocation is still a disputable issue [6; 7]. The influence of the element nature doesn't cause any doubts but the information of molecular-genetic and physiological mechanisms of this effect is usually very scarce.

The aim of this work is to estimate the retranslocation of heavy metals (HM) - copper (Cu), zinc (Zn) and cadmium (Cd) - from the tree leaves during their autumnal senescence and find

how plant species traits and the nature of HM can influence on retranslocation value. The influence on retranslocation of one more factor – the nutritional status of soil solution – is not to be discussed in this work and will be reviewed in our other paper.

Materials and methods

The study area is located in the south-west of Meshchera lowland (the central part of the East European plain), in the zone of mixed forests. Hindered hydrodynamics and poor sand soils which are the heritage of Quaternary glaciation determine the specific features of soil-plant conditions of the study area. Scotch pine (*Pinus sylvestris*), birch (*Betula pendula)* and aspen (*Populus tremula)* are the edificators of plant communities. Under conditions of a more fertile soil oak (*Quercus robur)*, spruce (*Picea abies)* and alder (*Alnus glutinosa)* also play an important role in the structure of plant communities.

Seasonal sampling of tree leaves was done in the beginning of June, the end of July - the beginning of August, the end of September and the end of November (for coniferous trees) of 2013. The sampling periods were consistent with different stages of leaf ontogeny: leaf formation, maturity and senescence. All samples of phytomass were dried to a constant weight and were ground finely using the laboratory mill. Each sample with the mass of 1 g was digested using a microwave system with HNO_3: H_2O_2: H_2SO_4: HF (24,3: 6: 2: 1) under the maximal temperature 200°C with subsequent evaporation. HM concentrations (Cu, Zn, Cd) in the samples were analyzed using atomic absorption spectrometry («Spectre 5-4»).

On the basis of obtained data for each element the retranslocation efficiency was calculated [as in 5]:

$$R_{(t)} = \frac{X_M - X_{(t)}}{X_M} \times 100\%,$$

where $R_{(t)}$ – retranslocation efficiency defined as the percent portion of a chemical element exported from the leaf tissue before *t* time [1] (in our case - before leaf fall); X_M – the

average element concentration in the leaf tissue in the middle of vegetation season (at the end of July - the beginning of August); $X_{(t)}$ - the average element concentration in the senescing leaves before they fall (at the end of September).

Results

In table 1 the calculation results of the retranslocation efficiency of Cu, Zn and Cd from tree leaves during their autumnal senescence are presented.

Table 1.

The retranslocation efficiency ($R_{(t)}$) of HM from tree leaves during autumnal leaf senescence (%)

Tree species	***Cu***	***Zn***	***Cd***
Quercus robur, 81 years	-29.081	-1.182	-28.266
Betula pendula, 40 years	-2.618	2.188	46.822
Populus tremula, 45 years	-40.534	8.355	22.278
Alnus glutinosa, 45 years	2.417	11.386	-60.730
Picea abies, 55 years	-3.369	41.085	-22.685
	45.425	*-13.943*	*49.144*
Pinus sylvestris, 30 years	30,318	8,272	480.222
	45.536	*-5.860*	*-95.394*

Note: «–» before the value $R_{(t)}$ means export (retranslocation) of element from leaves before they fall; «+» before the value $R_{(t)}$ means accumulation of the element in the senescing leaves compared to the stage of leaf maturity. $R_{(t)}$ values for which X_M - the average concentration of HM in tree needles at the end of September; $X_{(t)}$ - the average concentration of HM in tree needle at the end of November are shown in *italics underlined*.

Discussion

$R_{(t)}$ values presented in the table 1 can be interpreted in terms of influence of two factors on them: the nature of chemical elements and plant species traits.

As it is followed from the table 1 Cu is withdrawn from the oak and aspen leaves by the end of September. Despite the fact

that Cu, according to [8], is not a chemical element efficiently redistributed from old to young leaves and to meristems its retranslocation from photosynthetic organs during their senescence has been noted for the broad range of tree species: *Quercus suber* [9], *Quercus robur*, *Populus nigra* [4], *Pinus sylvestris* [2]. In our case the absence of Cu retranslocation from the pine needles can be explained apparently by the fact that according to [2], during autumnal nutrient retranslocation nutrients are transported from senescing needles mostly to the remaining needles for winter storage. Therefore, it's necessary to evaluate the specific features of Cu concentration dynamics in coniferous trees separately for needles of different age groups having opposite trends of biophile elements concentrations change.

The absence of autumnal Cu retranslocation from the birch leaves in our case is related to the much earlier retranslocation process in this tree. According to the obtained data Cu concentration in the birch leaves was reduced to 5.91 mg/kg (dry weight) already by the end of July, in other words, by more than 50% versus the similar value for the beginning of June (13.07 mg/kg). Some part of this reduction can be explained by the so-called dilution effect by increasing phytomass [10]. However the main reason is obviously active Cu retranslocation from leaves caused by high attracting capability of the maturing birch seeds. The requirement of Cu for formation of plant grains, seeds and fruits is well known [11]. It should be noted that, contrary to the birch Cu leaf concentration in other deciduous trees is reduced in average only by 6.8% from June to August.

It's remarkable the absence of Cu retranslocation from alder leaves. The same result for this tree species was also obtained by Maillard A. et al. [4], but it was left without the explanation by the authors. Nevertheless, the absence of Cu export from alder leaves is natural and is related to the specific traits of this tree species. Cu in plants according to [12] is included in composition of more than 100 different Cu-containing proteins. About 50% of

Cu in plants is present in chloroplasts and connected to plastocyanin where Cu is involved in photosynthetic reactions [11]. In the process of leaf senescence their cells are exposed to quite regular changes in the structure, metabolism and gene expression [13]. The main function of these changes is to provide by hydrolysis efficient remobilization of cell material which was accumulated during the leaf life. Mainly it is concerned of nitrogen which is frequently in deficit in the environment [14]. At that the main macroscopic evidence of degradation of chloroplasts which contain to 70% of leaf protein [15] and, therefore, especially important for nitrogen remobilization is leaf yellowing [14]. But autumnal yellowing isn't characteristic for alder: its leaves stay green before the beginning of winter. It can be an indication of the absence of protein hydrolysis and nitrogen remobilization. The nitrogen retranslocation efficiency in alder is 10% [16] - 16% [17], that is significantly lower than the average (for many plant species) nitrogen retranslocation efficiency which is equal, according to [1], approximately 50%. The absence of significant nitrogen retranslocation (and, consequently, retranslocation of other elements connected to nitrogen metabolism including Cu) is related to the alder capability to fix atmospheric nitrogen through symbiosis with actinomyces [16]. Therefore, the problem of nitrogen deficit in soil solution which is essential for many plants, for alder using a principally different nitrogen nutrition source doesn't exist. Therefore, the alder doesn't get any obvious advantages resulting from nitrogen remobilization from senescing leaves.

As it is followed from the table 1 significant Zn export from senescing leaves isn't observed in any of the studied tree species. In contrary, Zn is accumulated in aging leaves, especially in case of alder and aspen. It is in accordance with literature data: Zn is accumulated in old leaves of *Quercus suber* [9], *Quercus robur*, *Populus nigra, Alnus glutinosa* [4], *Populus euramericana* [18], *Pinus sylvestris* [2]. It's remarkable that the opposite tendency – Zn retranslocation from senescing leaves – is characteristic for

agricultural plants: barley and wheat that can be related to extremely high attracting capability of growing corn seeds especially in specially selected varieties [4; 19].

It should be noted that in literature we haven't found any adequate explanation of the phenomena of Zn accumulation in the old leaves of tree species. Perhaps, despite the broad range of Zn functions in all plants [11], tree species don't have significant attracting capability of seeds and storage tissue in relation to Zn. It should be marked that the issue of Zn phloem mobility in plants – the key mechanism involved in the element remobilization from the old leaves – can be resolved positively. Moreover, to date Zn chelators that are required for its phloem transport have been characterized (due to alkaline medium of phloem sap Zn can't move in phloem as free cation [20; 21]), and some transporters of «Zn-ligand» complexes to phloem. With that expression of genes encoding some of these transporters is increased in old leaves [22]. With phloem translocation of Zn coming to cytosol of aging cells (including transport from chloroplasts) sequestration of Zn in vacuole can compete. It's remarkable in our opinion that along with the tendency of reduction of Zn import to the vacuole of aging leaves of wheat (and, consequently, increasing of its phloem transport) [23], in literature one can also find proofs of the important role of vacuolar (and to some lesser extent chloroplast and cytosol) pool of Zn in extensive synthetic processes during senescence of leaf cells. Zn is involved in synthesis of various proteases including cysteine proteases localized in the vacuole of aging cells [15], and metallo-endopeptidases in chloroplasts [24]. Besides, during senescence specific small vacuoles appear in cells (SAVs – Senescence-Associated Vacuoles); these vacuoles are absent in non-old cells [25]. The distinctive feature of SAVs – their high peptidase activity mostly due to cysteine proteases. Proteases carry out hydrolysis of proteins to free amino acids capable to retranslocate from aging leaves [26]. Therefore, Zn is directly involved in nitrogen catabolism of aging leaves.

Cd, in contrary to Cu and Zn isn't an essential element and it is highly toxic for plants [27], especially taking into account its geochemical similarity to Zn [22]. The percent of Cd retranslocation from old leaves as shown in table 1 differs greatly among the tree species. Autumnal retranslocation of Cd from the leaves of aspen and birch – humidocat species actively (compared to other studied trees) accumulating Cd and Zn – is absent. It is in accordance with the tendency of close negative connection between the percent of retranslocation of Cd from the leaves of wheat and Zn concentration in them as noted in the work [28]. Probably, high Zn concentration can inhibit Cd transport to phloem cells since transport of these elements is through common transporters [29]. The well known capability of plants to accumulate Cd in the grain or seeds in higher quantities under the conditions of Zn deficit can also be related to increased phloem mobility of Cd under absence of competing ion [28].

Autumnal retranslocation of Cd from alder leaves is obviously an indication of principally different – non-protein – biochemical nature of Cd pool apparently localized in vacuole. Mobilization of the vacuolar Cd pool (which is in complex with ligands) isn't related to nitrogen metabolism, in other words, it goes independently from protein hydrolysis and therefore it is possible in alder. The Cd pool in the leaves of other plants has obviously similar nature. Cd retranslocation from aging leaves is important in terms of reducing the portion of this element involved in recycled migration in the ecosystems. It should be noted that since, according to [30], fluctuations in metal concentrations in plant tissue during a year are the most significant for non-essential elements, more reliable data of the retranslocation efficiency for Cd can be obtained by studies during many years.

Therefore, the nature of chemical element and species traits of plants are important factors influencing efficiency of HM retranslocation from the tree leaves during their autumnal senescence. Cu withdrawal from aging leaves and accumulation

of Zn involved in synthesis of nitrogen catabolism ferments can be assumed to be the most common tendency. With that variations in the retranslocation efficiency can be related to various attracting capability of reproducing and storage organs of plants, specifics of nitrogen metabolism processes and specific traits of phenophases. Further studies in this area can facilitate more accurate assessment of immobilized and recycling pool of HM in the ecosystems that is necessary for the evaluation of the ecosystem sustainability against chemical pollution.

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2. HUMAN ECOLOGY

Belousova A.G.

Impact of volcanic eruptions on humans

Russia
Master's student, Ecological Faculty
RUDN University, Moscow
Anastasia.belousova2011@yandex.ru

Abstract: Volcanoes are important in the life of human. Over the history of mankind there have been five most powerful eruption, after which people were killed and entire civilizations disappeared. But the contribution of even small eruptions is fatal to humans.

Key words: volcanoes, lava, ash.

There are different types of volcanoes. Currently geologists have registered about one and a half thousand active volcanoes on the Earth, not including submarine volcanoes. Main products of volcanic eruption are lava, ash and other substances that come to land surface after vulcanic activity. Volcanic ash is – one of magma pulverized products. It consists of dust and sand particles with admixtures of rock. Volcanic ash appears during explosive volcanic eruptions when it is discharged to the atmosphere and then accumulated on the earth. The particles of volcanic ash are similar to crystals of the of 0.001-2 mm size. As for the volcanic gas, it is discharged to the atmosphere and does not harm usually, but partially the gas can return to the surface of the earth in the form of acid rain. One of the most harmful gases is sulphur dioxide which has a pungent odor and irritates the mucous membranes of the nose, throat and eyes. Most of the victims of volcanic gas suffered from carbon dioxide. It is heavier than air and can accumulate to hazardous concentrations.

The people trapped under the ashfall have a cough, a discomfort at respiration, bronchitis developsment. Side effects of a volcanic eruption can be reduced through the use of high-

efficiency respirators, however if possible influence of ashes should be avoided. Long-term problems can include development of such diseases as silicosis, especially if the ash is characterized by a large content of silica. The dry volcanic ash gets into eyes and causes their irritation.

Conclusions. Modern active volcanoes represent the bright manifestation of the endogenous processes available to direct observation which has played a huge role in development of geological science. However studying of a volcanism has not only informative value. Active volcanoes along with earthquakes represent terrible danger to closely located settlements.

Eruptions of volcanoes often bring irreparable natural disasters which cause not only huge material damage, but sometimes even mass death of the population. The main affecting factors during the volcanic eruption are: shock wave, flying secondary projectiles (rocks, trees, etc.), volcanic ash, volcanic gases, thermal radiation, PI-relationsa flows.

Volcanic eruption often is followed by formation of a tsunami, landslides and fires. Small ashes, scattered in the air can cause difficulty breathing, airway obstruction, asphyxia and death. It sometimes contains toxic beginning (for example, fluorine), poisoning water sources. Dust and ashes complicate visibility, incapacitate the car engines, radio, communication, electrical system . All this makes it difficult to provide medical care and conduct medical evacuation. In some eruptions pyroclastic flows (fire avalanche) - are formed – they are - the gas streams containing a suspension of ash and stones and moving on slopes with a speed of 500-800 km/h (temperature reaches 1000°C). All this has a great harm to humans and all living beings, which is why this topic is relevant at all times.

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Doronina G.N.

Toxocariasis: Clinical Aspects. Threats of Toxocariasis to Humans

Bachelor's student of the Department of Forensic Ecology with the course on Human Ecology, Ecological Faculty
RUDN University, Moscow
doronina-galina-96@mail.ru

Abstract: The article is devoted to a disease caused by geohelminthes – toxocara canis. Toxocariasis is a zoonotic parasitic disease which is widely spread around the world. Eggs of Toxocara are highly resistant and tolerant to negative environmental factors. High stability of the eggs in the environment and a various ways infection by eggs poses a threat to human health, especially children.

Key words: Toxocariasis, Toxocara canis, Toxocara cati, geohelminth, toxocara eggs, zoonosis, definitive host, paratenic host, visceral larva migrans (VLM), ocular larva migrans (OLM).

Toxocariasis is widely spread among domestic and stray carnivores in the world. Puppies younger than 1 month are 100% infected by helminthes. However, cats have the highest infection rate in a mature, reproductive age. The wide spread of this disease is caused by various factors: a variety ways of transmission of parasites, regional socio-economic development and the violation of the maintenance and dog's walking rules.

In big cities and megalopolises the number of carnivores is continuously increasing. Infected animals contaminate the environment with toxocara eggs. Contamination of soil by nematodes of the genus Toxocara eggs varies from 2 to 60% in different regions. Moreover, this index is higher in rural areas than in the urban ones.

According to the World Health Organization (WHO), the prevalence of canine is high in all countries - 60-90%, the

prevalence among young animals is 100%. However, the prevalence to the human is wider, for example, in Belgium it is 2.6%, for the Caribbean islands it is 80%. Cases of Toxocariasis in Russia are registered in all climatic zones, except for Russian Extreme North, where the conditions for the parasite are severe. [1, c.47]

Toxocariasis is zoonosis caused by larva migrans of parasites of the genus Toxocara in animal's and human's organisms. Disease is characterized by prolonged and recurrent polymorphic clinical manifestations. The definitive hosts are dogs and cats, in connection with the largest spread of Toxocara canis and Toxocara cati, respectively. [2, c.18]

Genus Toxocara representatives are geohelminthes. Adults are similar to a common roundworm but they are wide side wings at the cephalic. [3, c.262]

Viability of toxocara eggs in the soil in central Russia is maintained throughout the year. From May to September there are optimal conditions for eggs development. Moreover, toxocara eggs develop and maintain the viability the whole year in a house.

Dogs and other canines are the main source of invasion. Infection ways of Toxocariasis for canines are varied: [4, c.265]

• eggs ingestion with water, food, soil;

• eating contaminated nonspecific hosts (black beetles, rodents);

• placental transmission;

• ingestion of larvae with infected dog's milk;

With humans, the disease is characterized by a prolonged course and disease recurrence. Humans are paratenic hosts. Risk of disease is polymorphism and severity of clinical symptoms.

Humans are infected by oral ingestion of infective embryonated Toxocara eggs from contaminated soil (saprozoonosis), unwashed hands or raw vegetables. Some people may be infected by ingestion of larvae present in under-cooked organs or muscle tissue of infected paratenic hosts such as chickens, cattle and sheep. [1, c.47]

The dominant clinical manifestations associated with toxocariasis are classified according to the organs affected. There are two main syndromes; visceral larva migrans (VLM), which encompasses diseases associated with the majors organs, and ocular larva migrans (OLM), in which toxocariasis pathological effects on the host are restricted to the eye and the optic nerve. [4, c.265; 3, c.261]

It is believed that children are more prone to visceral larva migrans. As a result of OLM, reduce acuity of vision, may cause bilateral blindness or strabismus. Often the visual organ damage is the only manifestation of the disease when there is small number of larva in an organism. [4, c.268-269]

The larva in the human organism can be viable for over 10 years. About 15% of cases occur without visible clinical symptoms. Infected persons can have abdominal pains, cough, sleep disorders, lowgrade fever and hepatomegalia. [5, e338]

Among the adult population are professional-risk groups. Group separation is based on the specialization of professions. Thus, high infestation is typical for the following professions: [3, c.264]

- Veterinarians;
- car mechanics;
- gardeners;
- employees of communal services;
- dog-fanciers;
- and etc.

To sum up, Toxocariasis wide prevalence in the world caused by socio-economic factors such as lack of dog run, growing number of stray animals. Another reason is a high resistance and tolerance parasite's eggs to negative impact of the environment.

The disease is dangerous for humans because it is very difficult to diagnose Toxocariasis. Also, human affection to dogs endangers their own health and the health of children.

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Fedeva D.D.

The impact of the environment on the develpoment of cancer cells

Russia
Bachelor`s student, Ecological faculty
RUDN University, Moscow
darja0404@rambler.ru

Abstract: Currently the number of people suffering from cancer has increased. Environmental deterioration influences the development of cancer cells. The biggest influence is rendered by carcinogens and radiation. People develop methods of dealing with these factors.

Key words: cancer, radiation, cancirogens, PAC, benzopyrene, nitroso compounds, pesticide, redox enzymes, DDT, radioactive elements.

Since the middle of the 20th century, the number of cancer cases has been growing rapidly. Many countries try to develop new methods of dealing with these serious diseases. Any human body is susceptible to cancer. However, breast cancer among women and lung cancer among men take the first place [1]. According to statistics, high standards of living contribute to more frequent development of cancer. The risk of being ill with cancer is more frequent in urban residents than in rural. This is due to unfavorable environmental conditions: pollution of water, soil, air. There are two factors of the environment that influence the occurrence of cancer cells. These factors are radiation and carcinogens.

A carcinogen is an agent that can cause permanent changes and damage in those parts of the genetic apparatus, which perform the control of somatic cells. There are different carcinogens. The first type is polycyclic aromatic carbohydrates. They are the result of emissions from the processing of organic substances. PACs are circulating in the environment. One of these substances is benzopyrene, which is accumulated in the soil. Then it goes through the plant roots into the leaves, which are eaten by people. PACs are transferred to long distances in water. Then they precipitate on the bottom. These particles are eaten by fish and fish is eaten by human. [2]

The second type of carcinogens is nitroso compounds. They are formed as a result of fuel combustion, chemical synthesis. Many of the compounds are contained in water, food, medication. They are accumulated in the air in the form of nitrogen oxide. Smog is formed as a result of suspended smoke particles in the fog during certain weather conditions. Because of it the number of cancer patients has increased. The nitrate content can achieve a high level because of smoking [3].

Pesticides are very popular in agriculture. These chemicals enter the human body through the digestive, respiratory systems, mucous membranes and skin. Pesticides easily enter the body and have a negative effect on the activity of redox enzymes. The

example is dichlorodiphenyltrichlorometylmethane pesticides (DDT). It is an organochlorine compound. Now it is not used but it remains in the soil for a long time. Mainly, DDT has an impact on the endocrine glands. Many pesticides are located in reservoirs. It is a result of runoff from agricultural fields during the rain [1].

The second factor of cancer occurrence is radiation. Radioactive substances get into the environment by different ways. For example, it is a result of testing of nuclear weapons or leakage from a nuclear power plant. Such substances are located in the water, air, in some organisms. It will be very dangerous if radioactive particles are released into the body in the form of a spray, gas and dust through the wound. Mountain areas can be radioactive. There are radioactive elements in the rocks such as isotopes of uranium and thorium, rubidium, potassium. The most radioactive sedimentary rocks are clay and potassium salts. In India there is a strip of 200 km, where there are monazite sands, which contain radioactive thorium. This strip is one of the places with high background radiation.

The explosion of the atomic bomb releases radioactive elements that affect the human`s circulatory system. These elements affect the thyroid and dairy glands, lungs and stomach. They are removed from the body for many years. For example, the half-life of radium in the body is 45 years [4].

Nowadays there are two methods of fighting with radiation: the concentration and localization, diffusion and dispersion. In the first case, the radioactive substances are concentrated in the form of solutions, go into insoluble compounds and stored until the dissolution of the substances. In the second case, these substances are thrown into the sea or ocean, where they dissolve with water.

To sum up, people should care about themselves and their health. People need to care about the quality of the environment and its components in order to preserve their health. Decreasing

carcinogens and other harmful substances will lead to a reduction in the incidence of cancer.

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Golovacheva I.V.

System: the mother and the embryo

Russia
Bachelor's student, Ecological faculty
RUDN University, Moscow
ip.irin@yandex.com

Abstract: Being a mother is a big responsibility. Even before pregnancy have the choice of a partner based on physiological and emotional needs. Recently scientists have proved experimentally the importance of implementing needs.

Key words: the mother, the embryo, the interaction in the system mother-fetus, the use of non-obvious needs.

The aim of this article as I think is to draw people's attention to the obvious benefit and importance of natural human needs (in this case the mother).

The beginning of life is fertilization of the egg by sperm, but the Mother of the unborn baby starts taking care of him

earlier. She chooses a partner, and thus the set of genes – it's all clear, everyone understands the importance of choosing a healthy partner. Few people pay attention to love. In this case, it refers to the strong mutual sympathy, and other definitions and all other features I'd like to leave completely to the discretion of the reader.

The latest known scientific experiment on the "love" was conducted by a team of scientists and biologists from the Max Planck Institute for ornithology in Germany. Scientists have selected 160 Zebra finches, and then divided them into 4 groups of 20 females and males, respectively. Then they were allowed to court each other and make mating rituals. After the birds determined the choice of their partners, the experimenters divided half of the "couples" and randomly shuffled them, forcing to interbreed with "unwanted" partners. In such pairs, the females didn't want to mate with "unloved" males, and tried to avoid them. And the males, in turn, were actively flirting on the side and tried to enter into a relationship with their former "beloved". After the females in all groups laid eggs, biologists have discovered that birds which were forced to mate unwanted partners in their nests have nearly a third more unfertilized eggs than "lovers". And even after hatching of eggs in "accident" pairs the risk of death due to poor care or negligence is much higher. Thus, the number of juveniles in pairs with the free choice of "love" partners was 37 percent more than in pairs of those birds who had no choice.[1]

Researchers believe that this indicates a deliberate mutual choice of partners among Zebra finches with compatible genes, and similar or complementary behavioral patterns, which increase both the number of successfully fertilized eggs and the efficiency in the taking care of the offspring after hatching. [1] Probably, every living thing has a need for love. No one knows what love is, but about the necessity of its presence there is no dispute. Go directly to the point. Nowadays there is common misconception of the future parents about the dangers of sex during pregnancy,

so due to moral reasoning, or medical advice the number of sexual acts has reduced. You should try to listen to nature, that is, the physiological needs must be taken seriously.

Recently, Australian scientists have discovered that sperm has the ability to suppress the immune response women, to ease pregnancy and its flow.[2] Seminal fluid not only serves to mechanically deliver sperm in the female body. Its function is to ensure optimal conditions for the survival of germ cells and facilitate conception. It is also known that pregnancy and the immune response — to a certain extent are conflicting processes and for successful conception and gestation, they should be in equilibrium. With a lack of regulatory cells the risk of complications such as unexplained infertility, miscarriage, toxaemia of pregnancy and premature birth increases. Until now, it was not known what manages their activation.

The staff of the University of Adelaide has bred laboratory mice, allowing different groups to enter one or four sexual contact. After that, animals were given low dose birth control drug. After 3.5 days, the researchers analyzed the number of regulatory T-lymphocytes in the uterus and para-aortic lymph nodes in females. It turned out that the level of these cells increased in both cases, however, after four sexual acts he was six times greater than after one. That is, regular sex life increases the probability of successful fertilization and immune level.[2]

It turns out that desires and needs (within reason, of course) are like a "tips" of nature! New hypotheses and experiments of scientists show us life from different sides, but... invariably point to the experience and wisdom of the past: in fact from ancient times through the tales and legends we were told about strong marriage, love. And only a loving couple could produce healthy offspring (physically and psychologically), and the future was bright.

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Kristoforova M.I.

Maestrìa de la Cátedra de Ecología Forense, Facultad de Ecología

La Universidad Rusa de la Amistad de los Pueblos, Moscú.

mari.kochanova.94@mail.ru

Lunev D.V.

Maestrìa de la Cátedra de Ecología Forense, Facultad de Ecología

La Universidad Rusa de la Amistad de los Pueblos, Moscú.

dlunchaz@yandex.ru

Kulieva G.A.

PhD en Biología, profesor titular de la Cátedra de Ecología Forense, Facultad de Ecología

La Universidad Rusa de la Amistad de los Pueblos, Moscú.

gkulieva@mail.ru

SEGURIDAD Y SALUD LABORAL (DE TIPO OFISINA)

Abstract: In order to identify the most appropriate methodology for assessing the working conditions on the office type workplaces, comparative analysis of procedures of special assessment of working conditions and certification of workplaces was held. It was revealed that the procedure of special assessment of working conditions is not able to control all the harmful factors affecting the office workers.

Resumen: Para descubrir el método más efectivo de la evaluación de la seguridad y salud laboral de tipo oficina hemos realizado el análisis comparativo del procedimiento de evaluación especial de las condiciones de

trabajo y acreditación de puestos laborales. Hemos revelado que el procedimiento de evaluación especial de las condiciones de trabajo no es capaz de controlar todos los factores nocivos que influyen los empleados.

Keywords: Special assessment of working conditions, certification of workplaces, occupational safety and health, office type workplaces, electromagnetic fields, daylight factor, ripple lighting, room lighting, microclimate parameters.

Palabras clave: la evaluación especial de a condiciones de trabajo , la acreditación de puestos laborales, la protección laboral, los puestos laborales de tipo de oficina , los campos electromagnéticos, el coeficiente de iluminación natural, el coeficiente de pulsación de iluminación, iluminación mixta, los parámetros microclimaticos.

La evaluación de las condiciones de trabajo es un parámetro fundamental para la evaluación ecológica. En estos últimos años, en nuestro país tenían lugar los cambios muy profundos en la protección laboral.

Antes, las condiciones de trabajo en el puesto laboral se evaluaban junto a la acreditación de puestos laborales, pero a partir del primero de enero de 2014, este procedimiento de antes, ha cambiado por la evaluación especial de las condiciones de trabajo.

El procedimiendo de control de los puestos laborales de tipo de oficina ha sufrido los mayores cambios, al excluir la evaluación de los campos electromagnéticos y electrostáticos, los parámetros microclimáticos y vibroacústicos, la intensidad y la pesadez del proceso laboral.

Así, la Ley Federal Nº426 que está en vigor, deja sin ningún control unos cientos de puestos laborales de tipo de oficina y también en edificios de enseñanza [1].

Para descubrir el método más efectivo de la evaluación de las condiciones de trabajo hemos realizado las medidas independientes de los niveles de iluminación [2, 3, 4, 5], los campos electromagnéticos y electroestáticos [6], los parámetros de microclima [7] en lugares de trabajo de los empleados de una

compania grande de Rusia [8]. El objeto de estudio descrito en el artículo no se llama para no divulgar la información confidencial.

Los resultados del presente análisis hemos comprado la evaluación especial de las condiciones de trabajo y de la acreditación.

En total 229 personas son atareadas en los lugares de trabajo en esta compañía. De los cuales los 113 son mujeres. Los empleados trabajan cinco días a la semana, 8 horas al día.

Entonces, vamos a contestar a la pregunta más importante: ¿Fue adecuada la medida de sustituir el procedimiento de acreditación de puestos laborales por la evaluación especial?

Como muestra nuestro análisis 5 % de los puestos laborales fueran más de la norma del nivel de los campos electromagnéticos de 24 % en promedio. Por consecuencia, la medida de control de los campos electromagnéticos en puestos laborales en oficinas que recientemente se ha llegado a ser invalida y la sustituye por la evaluación especial, fue necesaria, ya que, excesos superaciones de este parámetro.

Después de realizar evaluación hemos revelado variaciones notables de los parámetros adecuados del coeficiente de iluminación natural y el coeficiente de pulsación de iluminación, a saber:

- 5 % de los puestos laborales presentan el nivel del coeficiente de iluminación natural inferior a 53 % de la norma;
- 19 % de los puestos laborales presentan el nivel de iluminación mixta inferior en media a 14 % de la norma en promedio;
- 30 % de los puestos laborales superan el nivel del coeficiente de pulsación de iluminación en media de 60 % de la norma en promedio.

Por consecuencia, es preciso llevar el control de estos parámetros.

Los parámetros de microclima corresponden a la norma establecida por los documentos normativos.

Consistimos en resultados de este análisis, se puede decir que el procedimiento de acreditación de puestos laborales es más eficaz en la evaluación de las condiciones laborales (la tabla 1).

La tabla № 1

Diferencias entre la evaluación especial de las condiciones de trabajo y la acreditación de puestos laborales

Diferencias entre los metodos	Evaluación especial de las condiciones de trabajo	Acreditación de los puestos laborales
Los campos electromagnéticos y electrostáticos	No se realiza La tensión del campo eléctrico (5-2000 Hz): CE(31 V/m) >Norma (25 V/m) La tensión del campo eléctrico (2-400 kHz): CE (3,1 V/m) >Norma (2,5 V/m) La densidad de torrente magnético (5-2000 HZ): DTM (308 nTl) > Norma (250 nTl) La densidad de torrente magnético (2-400 kHz): DTM (31 nTl) > Norma (25 nTl) Conclusión: DEBE SER REALIZADA!	Se realizaba
Parámetros de la luz	Se realiza parcialmente IM: (250 lux) < 300 lux CDP: (8 %) > Norma (5 %) CLN (0,3 %) < Norma (0,6 %) Conclusión: DEBE SER REALIZADA!	Se realizaba
Parámetros de microclima	No se realiza Conclusión: no debe ser realizada.	Se realizaba

En este sentido, nosotros recomendamos volver a utilizar el metodo de la acreditación de los puestos laborales.

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Kirillova A.D.[1], Kulieva G.A.[2]

EVALUATION OF LEVELS OF ELECTROMAGNETIC FIELDS CREATED BY ELECTRIC POWER LINES

[1]Master's student, Ecological Faculty
sashak1994@mail.ru
[2]Candidate of Sciences, Associate Professor, Ecological Faculty
RUDN University, Moscow
gkulieva@mail.ru

Abstract: In contemporary world electromagnetic pressure on the human and natural environment is constantly growing, the number of power lines increases, so EMF monitoring is a part of the national system for the protection of health of the citizens.

Key words: electromagnetic fields, power transmission lines.

EMF monitoring is a part of the national system for the protection of health of the citizens. It is one of the physical factors that affect people indoors and outdoors. According to the guidelines of Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing recently a number of complaints and appeals of citizens to the Federal Service on the adverse effects of electromagnetic radiation of high-voltage power lines, passing through residential areas, has been growing. The practical value of the research is justified by the fact that its results will be used to produce the methodology of measurement of characteristics of EMF near power transmission lines [1].

Overhead lines are the most harmful for people are, as the electric field near overhead lines can cause negative impact on humans. This effect grows with increase of field strength and residence time in it.

In addition there is also the overhead line cable transmission - a transmission line, made by one or more cables laid directly into the ground. These transmission lines are less dangerous, because their impact on people is much lower than that of overhead lines [2].

Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing discusses the subject of the replacement of overhead lines to cable. We decided to find out how feasible such replacement is.

The aim is to estimate the EMF, generated around the overhead line.

Objectives:

1) Measure the levels of the electric field and the magnetic flux density near the power transmission lines;

2) Identify the dynamics of change in the level of EMF, generated by power lines, in time;

3) Understand whether the replacement of overhead line to the cable is suitable.

The object of study - the distribution of power transmission line of 110 kV - designed for power supply companies and large urban areas, connects the distribution point with consumers.

Measuring of levels of electric field and magnetic flux density near the power lines were carried out at the address: Moscow region, Noginsk, st. 200 years Cities, 5, in the autumn.

The distance to the nearest residential building is 50 m, to primary school - 100m. The length of the transmission line at the site is 500 meters.

To measure the electric field and the magnetic flux density we used «BE-meter AT-002. Measuring the parameters of the electric and magnetic fields». Total 126 measurements were carried out.

Conclusions:

1. The levels of electric field intensity and the magnetic flux density near the power lines in average are about 500 V/m and 2 mT, which does not exceed maximum acceptable level.

2. The dynamics of changes in the EMF was monitored during the day and days of the week. On weekdays from 10:00 am to 12:30 am minimum values were registered; from 2:00 to 2:30 pm values increased; from 5:00 to 7:30 pm maximum values were registered; from 9:30 to 10:00 pm there was a decrease in

value. At weekends, the morning values are minimum, but by evening they grow. At the distance of 50 meters from the power lines, all the values are almost equal to 0.

3. As the maximum acceptable level is not be exceeded, the replacement of overhead line on the cable is impractical in this case.

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Kolmakov M.A.

Horticulture as a new urban wave of stress-relief

Russia,
Bachelor's student , Ecological Faculty
RUDN University
MaxRap95@mail.ru

Abstract: In this article a new way of urban people time spending is discussed. Accurate information of horticultural process and examples of health improvements are given.

Keywords: horticulture, stress, plants, urban lifestyle, big city living, ecology.

Living in a big city brings stress. One of the reasons of being unable to stress out is a lack of fresh air and forested areas. It is not a secret that most people relax and get a psychological boost after spending, for example, their weekend in the woods. Citizens do understand it but sometimes a lack of engagement or

understanding of nature and human basic ecological needs may bring inaction in their today routine when it comes to stress relief. So mostly they take medicines. This whole situation has been coined 'nature deficit disorder'.

Some now argue there is a significant rift between our modern society and our basic ecological and physiological requirements. A need in fresh air and green surrounding is essential. This is why urban horticulture has a key role in helping city dwellers get back in touch with nature and natural processes. It deals with the problems of urban expansion and why it is important that our cities retain effective green infrastructure to remain functional.

Horticulture is the branch of agriculture that deals with the art, science, technology, and business of growing plants [1]. In recent years it has become popular among modern architectural companies as VEKASLIDE, PMMT, emA, CPG, etc. to do 3D models of future houses, malls, office centers, office centers with a lot of green elements in there, for example, made of ecologically friendly materials, placed in the middle of forested area, with the trees growing along the building, etc. This means that people who care about the way the future will look like know that it is today when a man has to understand that it impossible to live beyond nature.

They know what it is for citizens to meet every day without natural elements and feeling of it. It has been scientifically proved that an urban way of living without presence of nature in sight may reveal lots of symptoms that include reduced physical activity and related health issues based around a sedentary lifestyle; a reduction in well-being and increase in mental health problems; fewer social skills; reduced attention span/poorer academic performance; a lack of understanding/appreciation of our own basic environmental requirements (natural cycles, where fresh water/food etc comes from); apathy and an inability to deal with environmental challenges such as climate change; less understanding of or empathy for other species; and a lack of

understanding of the value that natural areas and green spaces can provide.

The role of horticulture in the everyday life of people cannot be underestimated. Everybody wants to feel comfortable, work with pleasure, relax in peace and at the same time knowing that everything that surrounds them will not harm their health. And this is why everyone who makes the surrounding not only beautiful but also salubrious gets honor and respect and make us feel that we can expect bright, clean, beautiful and healthy future urban routine days.

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Lyamina D. S.

THE ROLE OF PHYSICAL CULTURE AND SPORT IN THE ADAPTATION OF STUDENTS OF THE ECOLOGICAL FACULTY OF RUDN UNIVERSITY

Bachelor's Student of the Human Ecology Department of Ecology Faculty of RUDN University, Moscow

dalyam1995@gmail.com

Abstract: This article focuses on the role of physical fitness in the adaptation of students of the Ecological faculty of RUDN University. The article presents various aspects of the importance of sports among students.

Key words: Physical culture, adaptation, students, lack of exercise, health.

The creation of living conditions for a person to generate a harmonious combination of such qualities as spiritual wealth,

moral ethics and physical perfection is a very sensitive issue nowadays.

Physical culture is, for the most part, a social phenomenon, which depends on political, economic, social and health systems and education.

In modern society nano-technology that simplify our life and create comfortable living conditions are embedded more and more [1]. But, unfortunately, this simplification of life may not always be seen as a positive phenomenon. New technologies also pose a number of negative factors, such as:

- Lack of exercise
- Hyperkinesias
- Excessive physical and nervous stress
- The stresses of household and professional character
- Fatigue

All these factors lead to:

- improper metabolism,
- weight gain,
- depression-diseases of the nervous system
- diseases of the cardiovascular system.

The impact of these negative factors on a young growing body reaches such an extent that the internal functional system is unable to cope with it [2]. You can exercise, which can restore your vital reserves of the body and adapt to the changing conditions of the surrounding world. Exercising plays an important role in the improvement of the body and in maintaining good shape, developing a sense of responsibility, discipline, and reinforcing the pursuit of the goal.

Further in the article the aspects of the importance of physical culture among students of the ecological faculty of RUDN UNIVERSITYwill be thoroughly considered.

Firstly, exercise and physical activity increase social activity of a personality. Namely, in a student age older functions are formed and a student gets the opportunity to live and grow.

Secondly, physical culture and sport develop young people physically and thus revitalizes them [3]. In the process of learning, our students are often faced with a sedentary lifestyle that fosters physical inactivity and hyperkinesia. And these diseases have dire consequences of obesity and metabolic disorders, and lead to diseases of the cardiovascular and nervous systems.

Thirdly, sports activities and exercise relieves stress, mental fatigue and tension. It is common knowledge that mental exhaustion is worse than physical and it is much harder to get rid of it. But exercise helps to restore a morale, mental balance, causing light physical fatigue, which is useful for the body and its systems [4]. Playing sports is necessary for students after a hard school day, for emotional relief and restore balance throughout the body.

Apart from the reasons mentioned above, the sport and physical activity help to keep the body in a good shape, to be slim and fit and moderately inflated. A man with a good physique is not only an aesthetic pleasure, but also respect for others. And in the student's environment is an important for students and teachers as well.

To sum up, it should be mentioned that a constantly changing system of education is connected with the reforms affecting all spheres of our society. Therefore, students as future professionals need to be not only responsible, healthy, mandatory, with professional skills and knowledge, but also they have to possess the ability to adapt quickly to new conditions in a dynamic world.

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Mamedova Z.S.

THE IMPACT OF THE ENVIRONMENT ON HUMAN HEALTH

Russia

Bachelor`s student of the Department of System Ecology, Ecological Faculty, RUDN University, Moscow

zaminka1402@mail.ru

Abstract: Human Health - is the most important thing in life. Human nature - a place of its habitat. It's his sleep and food, and consequently his health. If you break this environment, it is possible to come to the irreversible consequences that will destroy our lives. However, we must correct and efficient use of our resources. Various chemicals, toxins, pollutants can not enter the atmosphere. We breathe this air and drink from our polluted sources, who were these harmful substances and use the soil for growing different crops that we eat. We must preserve our health for our future.

Key words: the environment, human health, environment, activity, nature, ecology, disease state, the pollution problem.

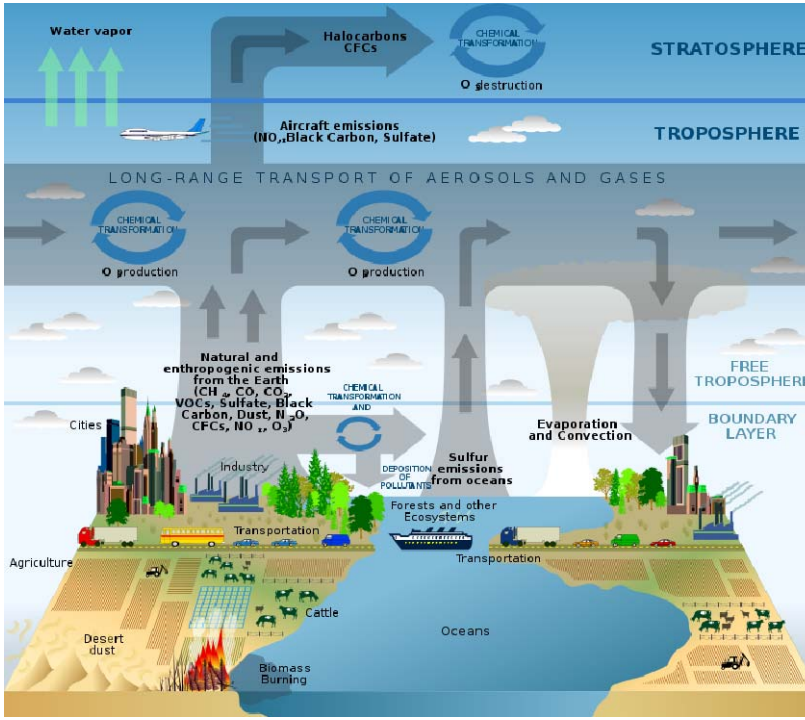
In the words of William Penn: «If you follow nature, stay healthy forever» [2]. Indeed, the nature gives man life in which he is a part of nature and acts according to its laws. Following the laws of nature, it gives us a long and happy life, and if you resist and contradict it, it leads to a long, serious and incurable diseases

that we are fighting now. Changes in the environment may change and human health, which affects the future.

Human activities have recently affected the planet. In most cases, any human activity is a source of environmental pollution. Because pollution is a destruction of flora and fauna, poor soil fertility, desertification. Most of the diseases associated with it disadvantageous influence of the environment that have arisen as a result of the man himself. Air pollution, water that is contaminated by the environment and chemical products have a negative impact and adversely impact on our health. This all creates the atmosphere of a bad environment in which we live. Today, despite the development of our science, we effectively solve the problem of environmental pollution. Most of the surrounding harmful substances falls from industrial plants, nuclear power plants, thermal power plants, from the huge landfills and road transport [3]. These toxic industrial emissions into the atmosphere via rain, dust and fall on our land, thus penetrating into the soil. Together with groundwater hazardous substances for human health fall into water sources. These include: mercury, arsenic, lead, and zinc. Soon these substances enter our body, causing various diseases which in the world today difficult to control, and in some cases impossible [4].

Food - one of the most important and necessary instincts to humans. Eating out, we get energy. Power is necessary for life. The quality and the amount of nutrients depends on our life.

One of the factors that affect human health is air. With the help of the air we breathe. According to scientists, the composition of air changed in the last few thousand years. During this time it is constantly decreasing amount of carbon dioxide. Reducing the amount of carbon dioxide began when there was vegetation on the ground. For the normal life of human cells need to 7% of carbon dioxide. Now the amount of carbon dioxide in the air is 0.03%. A quantity of oxygen in the air today several times more than before. The man in the modern world requires more carbon, so hence all the diseases. [5].



Picture 1. The evolution of the atmosphere.

The national economy is strong and powerful source of emissions of harmful substances into the atmosphere. Every year emits about 1.5 million. Tones of waste, which are harmful to our health. In towns and cities with millionaires has the highest level of air pollution. These include the cities of Russia, namely, Omsk, Irkutsk, Krasnoyarsk, Kemerovo, etc. As a result of human activities, in the air there is a variety of gaseous and particulate matter [6].

Human health depends on many factors, but the most important factor - the environment. Effects of the environment is reflected in our state and can cause great and irreparable damage to our health [7].

Chemical, biological and physical factors adversely affect human health. The chemical can include microorganisms, and

include mold, parasites, viruses, bacteria, etc. Physical factors - is any harmful external substance, and biological factors - a multicellular biological objects [1, p.18].

To avoid problems with contamination of the environment, and to avoid contact with the human body of harmful chemicals and poisons, you must upgrade to a more efficient and better technology. These technologies have a positive impact on us and did not do a lot of damage and detrimental to all humanity, without any consequences. To do this we need to use the sun's energy on a commercial scale, resources, land, water and wind power [8].

Today, all plants, all plants, all facilities are polluting our environment. Modern equipment is very expensive and not always reliable. The problem in our world is very global and no unification of mankind, we can not go to green energy and green production. We must do it together.

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Pichugina E.

EVALUATION OF PHYSICAL ACTIVITY OF STUDENTS IN THE FUNCTIONAL STATE OF THE ORGANISM

Russia,
Bachelor's student of the Faculty of Ecology
RUDN University, Moscow
pichugina94@inbox.ru

Abstract: This article provides information on the impact of physical activity on the functional systems of organism of students.

Key words: physical activity, functional systems, nervous system, cardiovascular system, students.

Every year, the human needs for mineral resources is increasingly growing. In this regard, many fields to the nearest time will be exhausted. It is therefore necessary to reflect on the broader use of alternative energy sources.

Nowadays sport and other physical activities are becoming very popular among people of all ages all over the world. It is known that physical exercises have a positive impact on the work of all functional systems of organism, so affirmation of this vital position among young people is particularly important. The

importance of this group of the population is its value as a generation, in the near future are actively engaged in supporting the national economy and the improvement of the demographic situation.

Physical activity plays an important role in the formation of functional reserves of the organism [8]. The set of training activities and teaching loads in high school has high demands to the capabilities of the organism, and the discrepancy between the volume and intensity of physical activity and adaptive capabilities of the organism can cause a number of changes in its functional systems, especially in the cardiovascular and nervous system. [4, 6].

The impact of the educational load with a high level of mental and emotional stress, increased requirements to the amount and quality of knowledge. It leads to disturbance of the motor mode, a negative impact on the functionality of organisms of students [1, 9]. This reduces adaptive reserves, and there are situations of mismatch mechanisms of regulation of autonomic functions that occur in students' fatiguability and health deterioration. [2, 4, 5, 11].

It is important to note the relationship between the level of mental activity and the degree of fitness of the organism. It is necessary for the normal functioning of the brain to pulse flow from the various systems of the body, including the muscles. Implementation of mental work amplifies the tension of skeletal muscles, especially the muscles of the neck and back, face, hands, arms and shoulder. Continuous operation is addictive to these stimulation, because of which begins the process of inhibition, reduced working capacity, because the cortex is no longer able to cope with nervous excitement that begins to spread throughout the muscle. Regular physical exercises can relieve the muscles from excess stress. [3, 10]

Another functional system, which should pay attention - cardiovascular. It is one of the first involved in the compensatory-adaptive activity as an effective indicator that can determine the

potential level of adaptability of the autonomic functions of the body, developing under the influence of physical activity [13]. So it is in the cardiovascular system and its regulatory mechanisms to generate sustainable long-term adaptation under the influence of sports exercises, so in the future we can estimate the functional state of the organism and reserves for resistance to adverse environmental conditions. [7, 12].

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Ponomarev F.E.[1], Ogorodnikova E.N.[2]

CHARACTERISTICS OF SOIL PROPERTIES LGOVSKIY THE KURSK REGION IN CONNECTION WITH THE ECONOMIC DEVELOPMENT OF THE TERRITORY.

[1]Master's student, Ecological Faculty

fedorfcsm@mail.ru.

[2]Candidate of Geological and Mineralogical Sciences, Associate Professor of the Faculty of Environmental Ecology

ogorodnikova50@mail.ru

Abstract: The article is about researches of Kursk region`s grounds, that is used to plan the building of the highway on this territory.

Key words: settlement-sensitive clay soil, particle size distribution, water content, dial gauge.

The main objects of study were soil samples from Kursk region, Lgov area. The reason for choosing these lands is construction of the motorway in the near future.

There are subsidence loess soils which lie at a depth of 5 meters in this area.

The soil samples were taken in plastic tubes, lubricated with Vaseline from the depth of 1.0 m, while maintaining the natural structure and moisture.

They are presented with brown semi-hard macroporous loam with inclusions of carbonates.

In grain size distribution particles of large and medium dust (31.3 and 15%, respectively) prevail with the content of clay particles - 32%

Determination of subsidence was conducted by the method of two curves in the CRC-1 device. From a sample of soil monoliths, we cut out the metal ring (2 cm height of the ring, square ring 40sm2), the inner surface was also smeared with Vaseline. With the working ring ends we stacked filter paper, then it was combined with the guide ring and placed in the base unit. Deformations of the sample were measured by dial gauge. Scale interval of indicator was 0,01 mm.

Determination of sample deformation in a natural addition was conducted at loads of 0.05, 0.1, 0.2, 0.3 and 0.4 MPa.

Results of the experiment were recorded twice a day at 9:00 and 17:00, and if in 16 hours a drawdown did not exceed 0.01 mm, we added a load and created a new load step.

The experiment was conducted for 14 days. To investigate the effect of soaking on the deformation, loess soil was soaked in the bottom from the pan directly into the compression tool.

After complete wetting we determined a soaked soil deformation.

The results of these studies are presented in Figure 1.

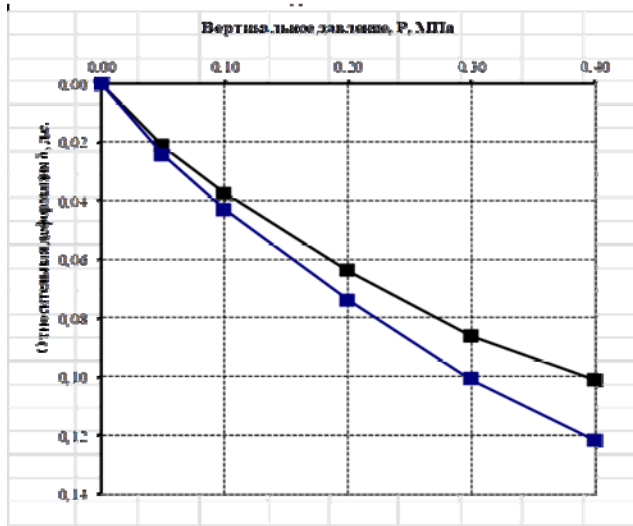

Fig. 1 The dependence of relative deformation of loess soil on load with natural addition (upper curve) and in the water-saturated state (lower curve).

As we can see from the graph, with natural moisture and soaking, deformations increase with the seal load. Moreover, the relative deformation increases for water-saturated sample.

Research has shown that the investigated soils are characterized by subsidence under load from 0,2MPa that determines the need for seals to eliminate the destruction and deformation of the roadway on the proposed motorway.

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Zenin E.A.

ANALYSE DE CORRÉLATION ENTRE L'INCIDENCE LES MALADIES RESPIRATOIRES DES ENFANTS ET DE LA POLLUTION DE L'AIR

Russie
Doctorant, Faculté écologique
Université de l'amitié des peuples de la Russie
zenya.evgen@mail.ru

Résumé: Une étude corrélationnelle entre des effets de la pollution de l'air et la morbidité respiratoire chez les enfants de Moscou démontre une dépendance entre l'incidence des maladies chroniques des amygdales et des végétations adénoïdes et les concentrations de CO dans l'air de la ville, une dépendance entre le niveau du NO2 et rhinite, pharyngite et sinusite chez l'enfant, la pollution atmosphérique étant responsable de l'asthme chez les enfants.

Key words: morbidité respiratoire chez les enfants, pollution de l'air, Moscou, maladies chroniques.

Introduction**.** Les maladies des organes de la respiration occupent une place leader dans la structure de la morbidité de la population âgée de 0 à 14 ans [2]. Comme elles ont des effets à long terme [3], la santé de la population des enfants, en raison de la forte réactivité de l'organisme à la pollution atmosphérique, est indicatif du degré de danger et de la contamination de l'environnement.

Le but de cette étude est d'identifier la corrélation entre l'incidence des maladies respiratoires des enfants et de la pollution de l'air. L'analyse de la morbidité infantile a été effectuée dans l'arrondissement Nord de la ville Moscou.

Parmi les maladies des organes de la respiration de l'arrondissemnent ce sont les maladies chroniques des amygdales et des végétations adénoïdes qui occupent la première place [1].

Méthodes [1]: 1. L'analyse littéraire et le stock de matières;

2. Les études de l'air et la photographie; 3. Le traitement de base de données dans Excel; 4. Analyse de corrélation.

Résultats de la recherche**.** Cette analyse a montré que, en 2014, le nombre d'enfants atteints de maladies respiratoires s'élève à 1521,8 sur 1000 l'ensemble de la population, qui est 1,2 fois plus élevé qu'en 2008.

L'analyse de corrélation est présentée dans le tableau 1.

Tableau 1

Tableau récapitulatif pour l'analyse de corrélation

	1. Maladies chroniques des amygdales et végétations adénoïdes / concentration du CO moyenne annuelle		2. Asthme bronchique / La moyenne annuelle de la concentration les matières en suspension		3. Rhinite, pharyngite et sinusite / La moyenne annuelle de la concentration du NO_2, mg/m^3	
2014	32,8	0,53	1,4	0,14	0,21	0,04

Ainsi, l'analyse de corrélation a révélé une forte dépendance (r_{xy} = + 0,747 pour p = 95%) entre les maladies chroniques des amygdales et des végétations adénoïdes et les concentrations d'oxyde de carbone sur les autoroutes de la ville.

L'analyse de corrélation a révélé la moyenne dépendance (r_{xy} = + 0,548 pour p = 95%) entre les indicateurs primaires de la

morbidité des enfants atteints d'asthme bronchique et les indicateurs de la pollution atmosphérique. L'analyse de corrélation a révélé la moyenne dépendance (r_{xy} = + 0,555 pour p = 95%) entre le niveau de la pollution par le dioxyde d'azote et l'incidence de la rhinite chronique, pharyngite et sinusite.

Conclusion**.** L'un des principaux indicateurs environnementaux est l'augmentation du nombre de malades asthmatiques. La raison en est l'augmentation de la teneur en l'air ambiant des aérosols de taille inférieure à 10 pm, ainsi que la croissance de la pollution. Les polluants sont le monoxyde de carbone, dioxyde de soufre, le dioxyde d'azote, le formaldéhyde et le phénol.

Nous incluons encore dans la présente étude des maladies broncho-pulmonaire la rhino-pharyngite, pharyngite et sinusite. Les raisons de l'apparition de ces pathologies, en plus de l'infection, sont dans les derniers temps des substance toxiques volatiles, telles que les composés formés lors de la combustion de carburant.

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3. ESSENTIAL ENVIRONMENTAL PROBLEMS IN THE REGIONS OF RUSSIA AND IN THE WORLD

Akhmedinova K.

DESERTIFICATION PROCESSES ON THE WEST COAST OF LAKE BALKHASH (REMOTE SENSING DATA)

Master's student, Ecological Faculty
RUDN University, Moscow
akhmedinovakamila@gmail.com

Abstract: The relevance of the work lies in the fact that desertification is one of the most serious threats to Kazakhstan. This geo-ecological problem affects about two thirds of country's surface, and therefore it is very important to identify and to solve it on time.

Key words: desertification, space monitoring system, decoding multi-temporal images, the degree of hydration, the severity of overgrowing processes, waterlogging, aeolian processes, hydromorphous degree, aquatic, hydromorphic, semihydromorphic, automorphic

Nowadays there is no space monitoring system of desertification processes in Kazakhstan. The problem of determining the development of desertification processes is independent. Therefore, as part of this work the archival *Landsat* satellite data for high-resolution visual interpretation and selection of ecosystems in the basin of lake Balkhash were involved.

The result of decoding multi-temporal images for 1979 and 2001 in the study area was mapping of appearing and disappearing of types of natural complexes depending on the humidity, which differ in the degree of hydration, the severity of overgrowing processes, waterlogging and aeolian processes. They are grouped by the author into four basic types, which differ in hydromorphous degree: aquatic, hydromorphic, semihydromorphic and automorphic [1].

Analysis of the decrypted images and tabular data showed the following:

- The territory in 3029 covers an area of 62 km2;

- For the period 1979-2001 there have been significant changes in the structure of natural complexes. So the area of automorphic systems extended, i.e. drained areas - plains covered with halophytic-shrub vegetation and saltwort. On the other hand, the semihydromorphic area, hydromorphic and aquatic complexes, which somehow still retain the connection with water shortened. It is most notable how the area of open shallow lakes have changed during this period, by 2001 they have overgrown by almost 70%.

If to compare not the area but contour of natural systems in two maps, we can clearly trace the chain of transformation in the direction of drainage: aquatic => hydromorphic => semihydromorphic => automorphic. This process is called desertification of soils, a complex set of processes leading to the formation of the equilibrium automorphic soil in arid climate. [2] A very striking example is a small salt lake Alakol, adjacent to the south-western part of lake Balkhash. In 1979, it occupied an area of 195 km2, and already in 2001 it was divided into two even smaller lakes, giving a total of 23 km2 area. The rest of the area is occupied by saline soil spreading beyond the former waters of lake Alakol. The amendment says about the incident displacement of natural systems: aquatic => automorphic.

The reasons for changes in natural systems towards dryness, leading eventually to desertification can be both natural, such as aridity of climate and anthropogenic factors.

Thus, the research on the key area of the western territory of the Balkhash has shown how over time (over 20 years) natural ecosystems at a location nearby were changing. We derive a chain of changes, which is indicative of the ongoing processes of transition from wetter to drier types.

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Andreeva A.P

ENVIRONMENTAL PROBLEMS OF WESTERN SIBERIA

Russia
Bachelor's student, Ecological faculty
RUDN University, Moscow
andalexandrap@yandex.ru

Abstract: The article deals with the main environmental problems in Western Siberia and the consequences caused by man-induced impacts. This region is very attractive for people because of its great amount of nature recourses.

Key words: Western Siberia, environmental problems, oil-and-gas industry, oil products, air pollution, water contamination, logging.

Western Siberia is a unique region of Russia. It has the area of more than 2.7 million square kilometers. For the Russian Federation it's a great source of minerals. However, this territory is very difficult for exploration because about 70% of it is covered with marshes [1].

The region is very rich in oil, natural gas, forest and coal resources. So the industrial activity is developing intensively. In this regard environmental situation is becoming worse. The problem of oil-and-gas industry is the main in Western Siberia.

Currently, Western Siberia provides more than 70% of Russia's production of oil and natural gas, about 30% of coal and about 20% of wood. There is a strong oil and gas complex. The area of oil-and-gas properties is about 2 million square kilometers.

Nowadays oil production is accompanied by excessive burning of associated petroleum gas. The utilization level of this gas is low. The annual losses of associated petroleum gas in Western Siberia amount to 6-7 billion cubic meters. So oil-and-gas industry is characterized by the lowest purification rate of emissions. The greatest number (more than 60%) of emissions of pollutants from oil-and-gas production complex accounts for gas flares, which burn associated gas [2]. They contaminate atmosphere with the products of this combustion – nitrogen oxides, sulfur, carbon monoxide and hydrocarbons, which also contaminate soil, water bodies, and vegetation. Also gas flares contribute to greenhouse effect. Over the years of exploitation of mineral resources of the Tyumen region there were produced more than 6 billion tons of oil and burned nearly 225 billion cubic meters of associated petroleum gas. According to the statistics, the morbidity of the population in this region is higher than in other regions of Russia. The number of cancer and pulmonary diseases, child mortality is also significantly higher there [3].

During the exploration and production of oil and gas, there is a high risk of environmental accidents and disasters, accompanied by emissions and oil spills, fires at oil and gas wells, pipeline breaks. It can reduce the quality of soil, surface and ground waters, it also does harm to living organisms. In Western Siberia there are 100 thousand kilometers of pipelines, 30% of which have a 30-year useful life [3].

Another environmental problem of Western Siberia is air pollution. In general the emissions of air pollutants in this region are about 24% of all in Russia. Formaldehyde (50 %), nitrogen dioxide (45 %) and benzopyrene (35 %) have the most harmful impact on air quality in residential areas. The maximum

concentrations of these pollutants are in Kemerovo, Novokuznetsk, Omsk and Barnaul. The average annual increase in emissions of pollutants into the atmosphere is about 15%. The main sources of contamination are transport and oil-and-gas spheres [4].

In some regions of Western Siberia there is a radioactive pollution of the environment as a result of radioactive fallout. Considerable danger is caused by the activity of nuclear-technology organizations such as “Novosibirsk chemical concentrates plant” and “Siberian chemical plant” in the Tomsk region.

Ecosystems of a significant number of river basins in Western Siberia have a long man-induced impact. The main part of pollutants consists of oil products, nitrogen compounds and phenols as a result of oil-and gas industry. Hydrographic system of this region has big problems because of its effects. In the residential areas water bodies are contaminated with oil products, ammonium, phenols and iron because of sewage disposals. But in the southern part of Western Siberia the situation is more favorable.

In Western Siberia the use of forest resources is quite low. The average volume of logging is about 8%, whereas the national average is about 18%. But in the region there are 70% of old-growth forests. They often dry out, so it can increase the number of fires and decrease productivity of biosystems [5].

In that way the main problem of Western Siberia is the activity of oil-and-gas industry, which affects all spheres of people’s life and wildlife. The gradual depletion of fuel-and-power recourses reserves in this region leads to their economically and environmentally inefficient use.

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Apraxina P.V.

An environmental performance evaluation of a regional SPNR case study of the Nizhnehopersky Nature Park.

MSc Student, Ecological Department, RUDN University
polina331@mail.ru

Abstract – Performance analysis of the Nature Park protected area, characteristics identification of operation and problems in the territory were considered. It allowed to make conclusions of the current state of the park and propose the ways to solve existing problems.

Key words: SPNR, conservancy, performance evaluation.

Introduction**.**

Currently, problems connected with negative and undesirable implications of anthropogenic activity, and issues on

ecological optimizing of the regional nature are critical. Solutions to most of these problems lie in the creation of SPNR.

For the several regions located in steppe and forest-steppe zones, a key unit of an ecological framework and a SPNR basic form are nature parks. The nature parks operation supports landscape conservancy and leads to nature regulation in the territory. This is true for Volgograd region. There are seven nature parks there.

The Nizhnehopersky Nature Park in question is characterized by a high conservation of the steppe ecosystems, river valleys and ravines with a high level of landscape and biological diversity, and by good supply of recreational resources. Also within its territory agricultural land use is actively conducted.

Purpose and objectives of research.

The purpose of this work is a geo-ecological problem definition of the basic nature types with environmental performance evaluation, performed in the territory of Nizhnehopersky Nature Park, and a research of optimization ways.

The Nature Park “Nizhnehopersky” is a special protected natural area of regional level and it has a status of the nature park, located in the northwest of the Volgograd region in the three areas. The natural park has continuous form and the structure has a cluster character. Environmental zone is located across the natural park of cluster plots tending to its central axis.

Results of research.

A method of environmental performance evaluation for SPNR helps to define the problems in the SPNR territory and find ways of solution. The method of M.S. Stishov was selected for the park operation characterization.

A NNP reference function is characterized by representative averages 64.2%, which is almost 2 times lower than the maximum efficiency (100%). High clustering in the area of environmental protection increases the impact from natural

resources, carried out in other functional areas, which is reflected in the significance of the value (V) and importance (I).

An efficiency of NNP refugium function is only 61.1%. This is due to the cluster character of the conservation area in the entire park, the more fragmented nature conservation area, the reduction in the animals' habitat.

Environmental efficiency of reservation function is 50%. The greatest contribution is comprised by hunted species.

A monumental function is able to approximate to the ideal, and is 100%, this is due to the presence of the park natural objects and landscapes on the territory of the protected area. They have environmental, scientific and cognitive value, which are not violated, and their protection is implemented effectively.

A role of the natural park in the maintenance of eco-stabilizing function is 60%. The current state of the natural park and the implementation of its environmental zone functions are satisfied. The main reason for reducing the value of the function is a factor of anthropogenic impact and pollution in the park, mainly in the agricultural zone.

Discussion of Results.

To sum it up, we can say that on the territory of the Nizhnehopersky park a number of significant problems can be identifies. The consequences of the problems have the negative impact on the effectiveness of its conservation. Among such problems there are:

• non-organized tourism;

• violation of the rules of fishing and hunting;

• unsustainable use and environmentally unfriendly modes of agricultural land;

• anthropogenic impact and pollution;

• reduction of species biodiversity in connection with unauthorized hunting-fishing;

The environmental implications are defined in the reduction of ecological landscape sustainability and environmental (dynamic) equilibrium violation, characteristic of natural systems.

For performance improvement, the most detailed method of the natural communities management with the purpose of conservation and improvement of the natural habitat qualities is:

• support or improvement of the quality of the hunting areas, through increasing the animals' population and diversity;

• attracting visitors to presentation of animals in certain areas and routes that will increase the interest to animals;

• cleaning cutting including the regeneration felling and cutting for shaping of the landscape;

• creation of forest stand that is appropriate to use natural resources in certain areas of the park (the area of the traditional extensive nature, active recreation zone, protected zones of monuments of history and culture, etc...);

• restoration activities on the lands disturbed by past human activities.

Taking into consideration the environmental performance values and the current structure of the functional zoning of the Nizhnehopersky Natural Park, it is obvious that it is necessary to improve the performance of environmental management by changing the conditions, which is important especially for the protected area. In addition, it is important to develop the management sector and implementation of new management technologies.

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Baah D.[1], Kharlamova M.D.[2]

OILSPILL RESPONSE ON THE WESTERN REGION OF GHANA: ENVIRONMENTAL MANAGEMENT PROBLEMS

[1] Postgraduate student of the Department of Monitoring and Forecasting of the Ecological faculty
RUDN University, Moscow
Ghana
dbaah@mail.ru
[2]PhD in chemistry, Head of the Department of Monitoring and Forecasting
RUDN University

Abstract: The research project attempted to investigate if prevention of oil spill is better than cure. To ascertain whether improving maintenance and control of facilities reduces the cost of managing oil and gas spillage, two Ghana oil companies have been compared. Personal interviews, observation and report reviewing revealed that the primary cause of oil spillage in the western region of Ghana is the failures of the oil companies. Possible solutions in case of oil spill have been given.

Keywords: oil spill, environmental monitoring and control, polluter pay principle, oil spill response.

Introduction**.** Ghana is well-endowed with natural resources. Since 2007, off-shore exploration yielded commercial quantities of crude and natural gas. A large quantity of oil believed to have been spilled by an oil exploration company was sighted along the coast in the Ahanta West District in the Western Region of Ghana and has been rated as the worst of its kind in the history of catastrophic events happening to the country's ecosystem in recent times.

The main purpose of the study is to examine if prevention of oil spill is better than cure (i.e. oil spill response) as well as highlight the devastating impact of oil pollution especially on agricultural production. The basic assumption is that the increased control and monitoring would improve the environmental performance of the company and prevent oil spills.

Research design and methodology. Reviewing of previous research works and reports of the two major oil companies in Ghana was used. Random sampling technique was used to gather the data but most importantly observation was crucial in this research.

Analysis of results. The main recipients of the damage caused by oil spill include the soil, food crops, aquatic habitats and humans.

Crude oil affects soil as a result of toxic heavy metals present. Soil chemical fertility includes the macro nutrients (such as nitrogen, phosphorus and potassium), trace element (manganese, zinc, copper, iron, molybdenum, boron, chloride, and cobalt), cat ion exchange capacity, electrical conductivity and soil pH. The characterization of the soil samples obtained at distances around the oil rig were observed to be low in plant nutrients investigated for (K, Mg, Ca and Na) and high in toxic heavy metals (Zn, Pb, Cu, Cr, Fe and Mn).

Most of the changes adversely affected the growth of plants. Seeds planted in oil polluted soils generally absorb the oil and get destroyed. The spillage had greatly impacted on maize

and rice which is Ghana's staple food affecting national food index.

Elevated levels of lead found in marine water samples around the Jubilee Rig is an indication of the discharged of low toxicity oil based mud and other drill cuttings which contains these toxic chemicals. Marine fishing declined consistently from 2004 to 2007, inland fishing declined too due to the minor and undetected pollution incidents caused by the oil companies.

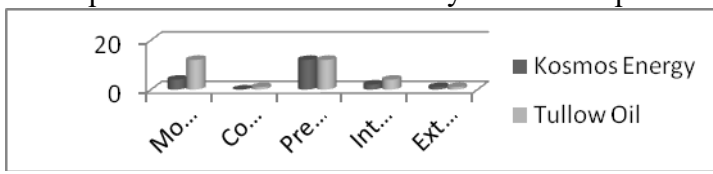

Figure 1. Comparative analysis of oil companies' environmental management systems (EMS) [2]

The above figure shows that apart from preventive action in which the frequency of checks is the same, "Tullow Oil Ghana" exceeds "Kosmos Energy Ghana" in all EMS. *[2]*

Conclusion and recommendations. The nature of the environments in which spills occur must be carefully analyzed, selecting the clean-up techniques, a response strategy or technology. The first task when preparing to conduct oil spill response operations is a comprehensive risk assessment and hazard analysis. The following recommendations are made to different parties involved in oil matters:

- The oil companies should enhance, as well as operate active Environmental management standards.
- Government should ensure that regulations and standards are rigidly enforced. This can be achieved by passage into laws of all pending bills in the oil and gas industry and all relevant environmental conventions ratified by Ghana are incorporated into domestic laws. Monitoring will confirm that commitments are being met.

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Balakerev V.V.

SURGING GLACIERS AND THEIR DEVASTATING EFFECT

RUDN University, Moscow

vitalij.balakerev@yandex.ru

Abstract: Glaciers usually are found in remote mountainous areas. However, some are found near cities or towns and sometimes present a problem for people living close by.

Key words: Surging glaciers, snow, ice, Karmadon, Genaldon, Kolka.

A glacier is a persistent body of dense ice that is constantly moving under its own weight; it forms where the accumulation of snow exceeds its ablation (melting and sublimation) over many years, often centuries.

Glaciers require special climatic conditions. Most of them are found in regions of high snowfall in winter and low-temperature zones in summer. These conditions ensure that the snow is accumulated in summer and is not lost during the summer. Such conditions prevail in polar and high mountain regions of the world.

A glacier is formed when precipitation in the form of snow or rain accumulate over time, turn into ice and begin to flow outwards and downwards under the pressure of its own weight.

The enormous weight of the thick ice layers, the effect of gravity on the ice mass are the reasons why the glaciers are flowing very slowly. The movement along the lower part of the glacier is slower than movement at the top due to the friction created as it slides along the surface. [1]

The speed of most glaciers changes very little from year to year. But not all glaciers have a slow speed. For example, the effects of surging glaciers can quickly flow, sometimes as much as ten to one hundred times faster than normal speed. Surging glaciers are found in almost all mountain systems of the globe. Especially a lot of them can be found in Alaska, Svalbard, the Pamir mountains of Central Asia and the Caucasus. [2]

Speed of surging glaciers is a subject to sharp fluctuations. In the life of surging glaciers have periods of relative peace, usually lasting from 10 to 50 to 100 years, alternating with short phases of rapid changes, or pulsations. During the period of pulsation masses of ice, accumulated during the rest in the upper reaches of the glacier, quickly slide in its lower reaches. Accordingly, in the upper reaches, in the area of removal, the amount of ice decreases and in the lower reaches, in the area of prinos and promotion, it increases dramatically like the river level during the flood.

Actually the surge usually lasts for several months, while the speed of the ice increases in ten and hundred times, there are cases when it exceeds 100 – 120 m/day. The glacier at the surge cracks, its surface becomes an impenetrable pile of ice blocks in the chaos of the crumbling blocks.

Glacial surge is fraught with disaster – ice avalanches, floods and mudflows, outbursts of lakes of the side valleys blocked by ice. [3]

In 2002 in the Caucasus, in the valley of the river Genaldon a so called "Karmadon disaster" happened. The culprit of emergency was a small pulsating glacier "Kolka". Premature failure of a surging glacier and the formation of high speed ice-water-stone of the landslide turned out to be a perfect phenomenon of a special type that has no analogues in the world in terms of scale and specifics of the development process.

Ice-mud-stone flow September 20, 2002, starting at 20 hours 08 minutes, rapidly moved almost 20 km along the valley of the river Genaldon at a speed of 150 - 200 km/h, destroying buildings, recreation facilities and the power lines. In the formation of a dam on the river Genaldon and its tributaries formed several artificial lakes. The same surge of "Kolka" glacier was observed in 1902 and 1969. Surge 2002 was the most devastating. In many ways, the catastrophe of 2002 was a surprise to experts, who, mindful of the development of the 33-year-old, assumed when the new stepping the same smooth and slow movement of the glacier, not accompanied by destructive consequences.

Scientists suggest that the "Karmadon disaster" is caused by a number of factors - of seismic, volcanic and meteorological character. [4]

The problem of surging glaciers much is unclear. Unclear is the nature of these glaciers, it is also unknown why some glaciers are able to pulsate and others are not. Experts do not fully understand and the causes of the pulsations. While there is only a lot of conjecture, but the fact of their multiplicity is a direct

reference to the unresolved issue. Only one thing is clear: the most important role in the ripple belongs to the periodic changes in conditions at the bed, such as the appearance and disappearance of melt water buildup and a drop in its pressure, freezing and thawing of the bottom ice.

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Dabbagh Alaa

MIGRATING DUNES AND DRIFTING SANDS

PhD student
RUDN University
Syria
alaa_dabbagh@hotmail.com

Migrating dunes and drifting sands negative impact on human, animals, plants life and facilities have been discussed, the emergence factors of sand dunes being stated. The mechanism of its movement has been identified. The paper is focused on practical solution to use natural resources in a scientific and thoughtful manner and provides some recommendations to tackle the problem of this destructive activity by applying dunes stabilization method, mechanical barriers, and by preventing grazing, logging and uprooting plowing lands.

Key words: dunes, drifting sands, movement, stabilization.

Migrating dunes and drifting sands became one of the critical environmental problems, which threaten the existence and

stability of residential areas, vital installations, agriculture, and forestry. It disturbs the ecosystem and eliminates wildlife, all over the world [2]. The emergence of this phenomenon and its movement are being under study in order to be brought under control, reduce its negative impact on human, plant and animal life and find ways to help stabilizing the dunes.

Sand dunes may emerge as a result of lands deterioration in dry, semi-dry areas, and sub-humid areas due to human activities and natural factors. Human activities are embodied in the following impacts of land-use:

- Plowing fragile soil;
- Logging and uprooting shrubs;
- Increment of livestock which consequently leads to overgrazing on natural pastures;
- Appearance of random roads as a result of permanent movement of livestock breeders.

Natural factors such as wind erosion of soil surface; weathering of psammitic and granitic rocks; water degradation of beaches by waves; rivers sediments after flood [4] go together. It results in denuded soils with high exposure to wind and water erosion process, and, consequently, the formation of sand dunes.

In all cases sands move depending on movement, speed and intensity of the prevailing winds. When wind speed reaches 15 km/h (15 cm above soil surface), sand grains begin to move and rotate according to their size [3]:

1. Sand creeping, when sand grains size is more than 0.5mm.

2. Sand jumping, when sand grains size is between 0.1- 0.5 mm.

3. Unsettled sand, when sand grains size is less than 0.1 mm.

Sand drift is directly proportional to wind speed. The volume of precipitation has the same importance. Deposition of sand grains starts when the winds slow down, forming different

types and shapes of sand dunes. Sands stop at the barriers. A dune is small if the sands are originated from dry and over dry areas; dunes form huge chains if sands are originated from water degradation of beaches and river sediments.

Sand encroachment and dunes have destructive effects both on areas they pass through and areas where the sand finally accumulates: drifting the fertile surface layer of soil, exposing the roots of plants, scratching or burying vegetative organs of plants; covering agricultural lands with sands; defacing facilities and irrigation canals; blocking railways and highways; threatening residential areas, contaminating air, water, and food [1].

Stopping sand drifting and stabilization of sand dunes require two procedures: a) temporary stabilization; b) permanent stabilization (See Pictures 1 and 2).

Temporary stabilization is valid for limited period only [5]**.** To prevent the arrival of sand loaded winds mechanical barriers can be built or the sand can be covered with different materials: petroleum, chemical or vegetable.

Permanent stabilization is achieved by planting the target area with various vegetation types (including forest, pasture) to link the sand grains reducing their movement. It improves soil properties, modifies the climate, which ensures the continuity of growth and development for those plants and the plants naturally present in the place [5].

Picture 1. Trenches with sand berms.

Picture 2. Pastoral plants

To sum up, we need to investigate places of expected emergence of sand dunes and then, applying appropriate methods and solutions, make everything possible to stop sand drifting and

dunes formation in a timely manner. In all cases, we should keep a keen eye on the target areas preventing grazing, logging, tree uprooting and plowing lands.

The process of permanent stabilization of the dunes by vegetation development is considered the most effective and safest method which guarantees continuity. It is economically feasible compared to other methods taking to consideration the costs of materials and the limited period of effectiveness.

This requires joint efforts, necessary implementation material support, and use of natural resources in a scientific and thoughtful manner able to ensure sustainability and continuity.

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Ermilova E. A.[1], Nekrasova M.A.[2], Chinh Le Cong [3]

EVALUATION OF MANGROVE ECOSYSTEM SERVICES FOR THE EARTH'S ECOLOGICAL SAFETY

Russia
[1]Bachelor`s student,t Ecological faculty
RUDN University, Moscow
evaermilova@gmail.com
[2]Candidate of Sciences, Associate Professor,
Russian foreign trade academy
Ministry of economic development of the Russian Federation
nekrasova@npenergoeffect.com
[3] Postgraduate student of the Department of Monitoring and Forecasting of the Ecological faculty
RUDN University, Moscow
chinhlc@yandex.ru

Abstract: The role of mangrove forests for the ecological safety of the Earth and its ability to resist anthopogenic and natural risks is considered in the research. The authors created a resisting dangers matrix and evaluated the ability of the mangroves to resist dangers while functioning as ecosystem. In the results the risks which can be resisted by the mangroves most strongly were listed.

Key words: ecological safety of the Earth, mangrove forests, forests services, risks matrix, valuating the role of the mangroves

Areas of mangrove forests started to decrease because of the reasons, which include human activities. This process showed the importance of the mangroves partly because of the mangroves environment-forming and environmental protecting functions. Therefore, the purpose of the research is the evaluation of the importance of the mangrove ecosystem services for the ecological safety of the Earth [1-3].

In the research the resisting dangers matrix of the mangroves was created (tab. 1). Firstly, dangerous factors were classified into anthropogenic and natural. Then they were systematized to several types and kinds (economic system, social

system, atmosphere, hydrosphere, biosphere, and geosphere). Also in the research 20 dangers and 3 resisting functions were distinguished [1,3].

In the research the next coefficients of resisting have been used (tab.1): full resisting (1), very strong (0,8), strong (0,6), average (0,5), weak (0,4), very weak (0,2) and not resisting (0). In the research the most relevant risks to the region of the mangroves growth were chosen.

The evaluation of the importance of the mangroves and evaluation of the complex resisting natural and anthropogenic dangers showed that the destruction of local population environment, sewage water pollution, desertification, loss of biodiversity and threats to the population health are being resisted by the mangroves up to 50% - 66,7%; changes in behavior of the local species of animals and the destruction of biogenic coasts – up to 46,7%; and the decreasing economic activity or others kinds of activity because of exceeding the limits of ecosystems technology-intensive threats -up to 40%. Other 11 dangers are being resisted by the mangrove ecosystems up to 6, 7% - 36,7%.
Thus, the most dangerous for people and coastal natural and human-made systems threats that can be resisted by the mangroves are the destruction of local population environment, sewage water pollution, desertification, loss of biodiversity, threats to the population health etc. The development of the matrix in the future will enable us to make more accurate prognosis of the limit level of anthropogenic effects on the areas which will not lead to violation of ecosystems functions and decreasing ecological safety of coastal areas, particularly coasts zones of the continents within 38º S to 38º N latitudes and the planet safety as a whole.

Tab.1.

The matrix of resisting the risks by the mangrove forests.

Risks			Functions of mangrove forests which are able to resist risks			Resisting risks by mangroves, %
			Physical	Chemical	Biological	
Anthropogenic	Economic	Loss of the raw materials which are being used in production of exported products	0	0	0,6	20,0
		Decreasing of economic and other kinds of activities because of exceding the limits of the technical capacity of ecosystems	0,2	0,5	0,5	40,0
		Loss of the materials and products which are being used by the local population	0	0	1	33,3
	Social	Destruction of the local population environment	0,8	0,6	0,6	66,7
		Threats to the population health	0,5	0,5	0,5	50,0
		Population migration	0,5	0	0	16,7
Nature	Atmospheric	Changes of microclimate	0,8	0	0	26,7
		Global climate changes	0,2	0	0	6,7
		Air pollution by harmful substances	0,5	0	0,6	36,7
		Decrease in the absorption of carbon dioxide	0	0	0,5	16,7
	Hydrospheric	Sewage water pollution	0,8	0,6	0,6	66,7
		Strong waves, tsunami etc.	0,9	0	0	30,0
		Floods	0,5	0	0	16,7
		Increasing of water salinity	0,5	0,6	0	36,7
		Destruction of biogenic coasts	0,8	0	0,6	46,7
	Biospheric	Desertification	1	0	1	66,7
		Loss of biodiversity	1	0	1	66,7
		Changes in behavior of local species of animals	0,8	0	0,6	46,7
	Geological	Endogenous processes	0,5	0	0	16,7
		Exogenous processes	0,5	0	0	16,7
Resisting to risks by each of 3 main functions, %			18	4,7	13,5	

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Filippova D.V.

THE ECOLOGICAL PROBLEMS OF THE RUSSIAN ARCTIC

Russia
Master`s student of the Ecological faculty
RUDN University, Moscow
dashadash_a@mail.ru

Abstract: Nowadays the ecological situation on the planet is quite complicated. Arctic should be investigated as an important component of the global climate system associated with its other elements: the transfer of heat, moisture, salt and water due to the circulation of the atmosphere and ocean.

Key words: habitat changes, anthropogenic pressure, ice melting, soil and groundwater contamination, environmental management.

There are 450 protected areas in the Russian Arctic, which occupy 94,6 million hectares. It includes reservations, national parks, wildlife sanctuaries and natural monuments. The first protected area in the Russian Arctic is Pechoro-Ilychinsky reserve. It was founded in 1930 and its aim is virgin forests safety.

The Russian sector of the Arctic takes up no less than a third of the entire Arctic and plays a globally important role in the

conservation of ecosystems, because it hosts the most typical landscapes of Arctic. Most numerous category of protected areas here is natural monuments (60%) but its area is not sizeble (0,25%) [1].

The Russian Arctic is home to 80% of all typical species in the Arctic. Because of their ecological distinctiveness a lot of Arctic species are extremely sensitive to habitat changes.

But the anthropogenic pressure on arctic land and sea ecosystems has been rapidly increasing over the past two decades. Therefore, this area is subjected to habitat reduction, modification and fragmentation.

In the past 20 years the use of arctic bioresources has been unsustainable and destructive to the Russian part of Arctic. So, many animals, plants and bioresources are collected in large quantities what leads to numerous losses in Arctic ecosystems [2].

But, unfortunately, 3 huge ecological problems were formed in the Arctic.

1. Climate change

Arctic is warming faster than other parts of the world, and the temperature rise effects are most destructive. One of them is the reduction of thickness and area of ice. In September of this year scientists have recorded the second in the last 5 years ice minimum.

The researchers predict that by 2030 the Arctic ice will have disappeared completely in the summer, and the consequences will be disastrous. This melting of the Arctic ice is hazardous. Sea ice supports the existence of the entire Arctic ecosystem and its disappearance will lead to irreversible changes for the Arctic. For example, polar bears get their food by hunting on the ice. But today scientists documented several cases of polar bears drowning in the water, unable to overcome the increased distance between the ice floes.

Ice, which is meant for reflecting sun rays, is rapidly melting. Because of it the dark waters of the ocean and soil are

heated more quickly. Danger methane deposits are one of the most powerful sources of greenhouse gases, which are hidden in the permafrost. Methane, emitted into the atmosphere, speeds up the process of global climate change as well.

2. Oil exploring and production

The Arctic is one of the few untouched by industry places of the Earth. But the region is linked to other parts of the world and, therefore, the pollutants come from surrounding areas to the Arctic through air, sea and river flows. Scientists estimated that the Russian Arctic has more than hundreds of "hot spots" areas where pollution substantially exceed the maximum permissible concentrations.

Oil pollution leads to the landscapes degradation, causing serious damage to river and marine ecosystems, impairs the quality of drinking water and air and so on.

According to some experts, due to the construction of the trunk pipeline every 100 km of the road leads to 500 hectares of damaged land. Every year the area of damaged land is increased by 10 000 hectares. In the Arctic the recovery rate of the local plant communities is significantly lower than in the southern regions, and the reclamation of contaminated land technology is ineffective. Moreover, in practice, reclamation is carried out only along roads and doesn`t affect areas which are situated near the roadside areas. Often, there is no real reclamation, only imitation: contaminated by oil soils are sprinkled with sand, after that the oil remains in the soil, getting into the ground water, and then - to the Arctic Ocean.

Several hundred thousand tons of oil products are taken into the seas of the Arctic Ocean only by the river flow. As a result, the concentration of pollutants in many seas (Barents, White, Kara and Laptev seas) today is 2-3 times higher than normal.

Oil production will certainly by accompanied by large-scale floods, the devastating effects of which are experiencing the whole of humanity. Oil, spilled in the Arctic, does not settle in one place, it spreads throughout the region and even beyond its

borders. Toxic precipitations penetrate to Eurasia and North America by water and air, causing irreparable damage to the flora and fauna. Settling on the feathers and skin of animals, oil deprives them of protection from cold and ability to fly.

In addition, associated petroleum gas (APG) is emitted during oil separation. This gas contains methane. It is a dangerous greenhouse gas, so the lack of efficient APG utilization system leads to toxic air pollution and accelerates climate change.

Besides the oil industry poachers often come into this region. In the last 15 years illegal mining of valuable species of fish, primarily whitefish and sturgeon has increased in the lower reaches of the Western Siberia rivers and the inlets of the Kara Sea.

Another serious problem of the oil regions is soil and groundwater contamination. For example, in the Nenets and Yamal-Nenets autonomous districts concentration of petroleum hydrocarbons in drinking water exceeds the norm ten times.

3. The battle for shelf

According to geologists, the Arctic shelf has about the third part of the world's oil reserves. However, oil production on the shelf entails tragic consequences: it is not only the risks of spills, but, also, the acceleration of global warming, melting ice, an extinction of rare animal species.

The modern world highly depends on oil, so the oil companies continue to move to the underdeveloped area of the Arctic in search of the last drops, ignoring the danger that oil and gas exploration might affect Arctic nature negatively.

Many serious environmental problems of the Russian Arctic are connected with poor environmental management in this region. These include: irrational nature management; limited spectrum of natural resources utilization; conflict between different types of nature management. Among the geoecological problems the special attention is paid to the three: 1) environmental pollution; 2) preservation of the territorial natural

resources; 3) degradation and violation of pasture and hunting grounds, spawning grounds and feeding areas of the rivers.

There are more than 100 hot spots, which were distinguished by scientists and mostly they related to industrial production. "Hot spots" mean sources or human activities that adversely affect human health, ecosystem stability and biological diversity. So, they can lead to negative economic and ecological consequences. The distribution of the hot spots in the region is uneven. There are 4 main regions, which are related to the chemical contamination of the environment. They are Murmansk, Norilsk regions and areas of hydrocarbon deposits in the North European part of Russia and western Siberia [3].

The economic development of the Arctic and the industry development, according to scientists, are the main reasons of environmental problems in the region. The Arctic is suffering not only from oil, but also from pollution by heavy metals, persistent organic pollutants (PCBs, DDT) and radioactive substances. At the same time replacing oil by biofuels and electric traction motors on, as well as projects in the field of oil and gas saving, can become a viable alternative to drilling in the Arctic shelf. In general, according to experts, the critical level of pollution of no less that 15% of the region area was registered on the territory of the Russian Arctic. Industrial pollution problem can only be solved by common efforts, rejecting raw economic model and using alternatives that ecologists offer us today.

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Frolova K. V.

SITE SELECTION OF SANITARY LANDFILL IN THE TERRITORY OF THE TVER REGION

Master's student, Ecological Faculty
RUDN University, Moscow
kseniaflo@yandex.ru

Abstract: The article considers the system of solid waste management in the Tver region. It describes a method of landfill site selection using GIS and MCE. The hierarchical structure of the decision making problem was established by using AHP for the case study.

Key words: waste management, landfill site selection, GIS, MCE, AHP.

Waste is an essential consequence of the city life. One of the main tasks of the city municipal infrastructure management is competent waste management. Often the solution of this problem becomes problematic for municipal and regional authorities.

Relevance of the work is justified by the absence of the competent waste treatment management in the territory of the Tver region. Also, due to the specifics of the location and the features of the landscape of the Tver region, namely the close proximity of groundwater and wetland areas there are additional restrictions when choosing the site for the waste treatment facility.

Analysis of papers on the subject of landfill site selection has shown that this issue is not reflected enough in Russian scientific research. So we also reviewed international papers on this matter [1].

Summarizing Russian and international approaches and the current state of affairs in the field of waste management in Russia, we have developed a technique that consists of the following three stages of decision-making:

1) Macroanalysis.

2) Microanalysis.

3) Assessment, when the best accommodation variant is determined.

Tver region - the subject of the Russian Federation, is a part of the Central Federal District. In 2012, on the territory of the Tver region 110 illegal dumps were revealed, with the total area of 168,000 sq.m. According to the information provided by the Russian Federal Supervisory Natural Resources Management Service in the Tver region, most landfills are technically outdated in this region, about 50% of landfills have been used over 30 years [2].

Thus, based on these data, we can conclude that in the Tver region there is a need to select a site for the landfill in order to organize the disposal of solid waste to reduce damage to the environment. Our attention was focused on the central part of the region, as near the city of Tver and in the Kalinin district the highest number of landfills has been registered and there is the greatest amount of waste here.

As a result of macro-analysis, we have a map that shows the area that is inappropriate and potentially suitable to host waste management facilities. In our case, at the stage of macro-analysis we excluded the following items residential areas, the territory of industrial plants, forest, conservation areas, bodies of water, roads.

Next 5 sites identified at the stage of macro-analysis and the corresponding required area were analyzed by 13 evaluation factors, including social, environmental and economic factors [3].

We have developed a set of evaluation factors for comparing landfill options and put values for each factor, and then each value was assigned a weight.

Then we evaluated the importance of factors by Analytic Hierarchy Process by Priority Scale Weighting. After that we tested connectivity index score - Connective index.

The index value was found to be 0.096, which is acceptable. If the value of the relevant index is within 0.1, the matrix of pairwise weighing is considered consistent [4, 5].

The most favorable site for the placement of waste treatment facility is the site near the village of Kurovo.

It should also be noted that during the construction of the landfill it will be necessary to take into account all measures to protect the environment. It is necessary to introduce a system for collecting and removing the filtrate.

Waterproof of the burial site foundations will help to eliminate the general rise of groundwater and the flooding of the territory [4].

The construction of the sanitary landfill, taking into account all measures to reduce the impact on the environment, as well as the placement of a waste sorting complex in the territory adjacent to the landfill, will enable integrated management of waste on the territory of the Kalinin district of Tver region.

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Ivanova A.V.

CHANGES IN STRUCTURE OF THE POPULATION OF MIDGES (DIPTERA, SIMULIIDAE) OF THE MINOR RIVERS IN THE SOUTH OF MOSCOW REGION

Master's Student, Ecological Faculty,
RUDN University, Moscow
vereta.nastya@mail.ru

Abstract – The paper analyses changes in the population of midges due to watercourse system degradation.

Key words – water quality, polytene chromosome, watercourse system.

In many regions of the world one of the most important components of blood-sicking dipterous insects are midges. Preimaginal development of midges happens in flowing reservoirs.

For the last 25 years there were serious economic changes in Moscow region. Water bodies, including minor rivers, have changed. Structural and hydrological indicators have changed due to clearing of floodplains and courses, primarily close to construction sites. Besides, there were chemical composition alterations in which the share of agricultural pollutants decreased and the share the petrochemical and municipal increased.

Data was collected within two field seasons of 2014 and 2015 since the end of May until the middle of October with repetitions in the rivers Nara, Mocha, Pakhra, Chernichka, Vorya. Because of unevenness of distribution of midges in a flow charges were carried out for a while on 30 min. Material was fixed in Carnoy solution Carnoy (spirit-vinegar stock- 3:1). For preparation of polytene chromosomes solution lakt-acet-orcein methodology was used In total 13 tests were selected, 12652 specimen oflavrae and dolls were seen and determined.

I used two groups to assure results comparability: I - the lower current of streams, an average current of the medium nad minor rivers (Chernichka, an average Mocha flow); II - sections of the lower current of the minor rivers, average current minor, giporitral or epipotomal (sites on which charges in the rivers Nara, Pakhra, Vorya, the lower Mocha flow).

In total in charges 7 types relating to 6 childbirth are revealed. On sites I of the type we found: *W. equina; N. lundstromi; B. erythrocephala;* O. *ornata; A. noelleri; S. morsitans.* In waterways of the II type: *W. equina; W. lineata; B. erythrocephala; A. noelleri; S. morsitans*.

B. erythrocephala were registered in the minor rivers during the whole season of observations. *S. morsitans* - during the whole summer. These types were constantly found in charges together, naturally replacing each other on development terms with a difference in 2-2,5 weeks. *W. equina* was present at charges since May to the middle of August, but judging by availability of mature larvae and dolls, its first generation took off in May, and the following began a hatching at the end of July - the beginning of August, owed take off to beginning of the second decade. *W. lineatUy* had close terms of development and in with shift for 1-1,5 weeks for later time. Other types were found in insignificant quantity and it is difficult to decide about their development.

Sites of water currents I and II of types differ in the structure and are based on the ratio of types. On sites I of type *W.*

lineatUy was not. - *N. lundstromi* и O. *ornate were not on sites II of type*. At the beginning of summer on sites I and II of types there was approximately identical average quantity of midges (about 500 specimen). At the end of July - August on sites of II type considerable rise in number to 2096. In the areas of the first type in the collections there were single specimen. During the periods of rise in number on sites of the II type as a rule one type dominated: in June and the middle of August - *S. morsitans*; in the II decade of July - *W. equina*; at the end of August - October - *B. erythrocephala*. In waterways I type number was more leveled with prevalence of *S. morsitans*. *O. ornata* at the beginning of July it was 24%, B. *erythrocephala* - 19%, *S. morsitans* - 56,8%. In the I decade of June with lower number of O. ornata was absent. At the same time S. *morsitans* was 54,5%, and *B. erythrocephala* - 28,8%. On sites II of type *B. erythrocephala* was 19% - 28%, *S. morsitans* - 54,5% - 82,3%.

In the 1980th years in Moscow region *W. lineata* was found only in the river Osetr. In the present time it is found in Nara and Pakhra in a significant amount. For the last 25 years there was expansion to the north more than 100 km.

There were serious structural changes in the population of midges of the minor rivers in South of Moscow region. In the late of 20th century on sites of the II type *S. morsitans* (34,5 *B. erythrocephala* (28,8%), O. *ornata* (21%) and *W. equina* (11%) dominated. On sites of watercourse of the I type O. *ornata* (32,14%) dominated earlier. *S. morsitans* (6,84%) and *B. Erythrocephala (6,2%)* acted as subdominants. Now evritopny O. *ornata* isn't found on sites of the II type and is found I of type. The share of *S. morsitans* on all sites has grown almost twice. Share of *B. erythrocephala* hasn't changed.

Expansion of *W. lineata* to the north, destruction of watercourse of the II type due to evritopny O. *ornata* loss and almost double increase of a share of *S. morsitans* point out serious reorganizations not only of biocenoses of the minor rivers

of Moscow region, but also about considerable changes in biogeocenoses of Moscow area.

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Starinskaya R.A.[1], Karl L.E.[2], Latschenova T.N.[3]

RADIO-ÖKOLOGISCHE ÜBERWACHUNG DES GEHALTS DES RADONS IN DEN KINDEREINRICHTUNGEN

Russia
[1]м.н. сотрудник, ГНЦ ФМБЦ им. А.И. Бурназяна ФМБА России, Москва
alifesty@gmail.com
[2]Студентка экологического факультета РУДН, Москва,
lidiakarl@yandex.ru
[3]вед.н. сотрудник ГНЦ ФМБЦ им. А.И. Бурназяна ФМБА России, профессор экологического факультета РУДН, Москва, д-р биол. наук, канд. хим. Наук
tlaschenova@yandex.ru

Annotation: Im Artikel werden die Ergebnisse der Überwachung vom Gehalt des Radons durch die Integralmethoden in den Räumen der Kindereinrichtungen in Lermontov wiedergespiegelt. Infolge der Untersuchung wurde festgestellt, dass der Gehalt des Radons im ersten Stock der Gebäude vom Vorhandensein des Kellers und von der hydrogeologischen Besonderheiten der Ortschaft abhängt.

Abstracts: In this work data of monitoring by integral methods of content of radon in premises of child institutions of the city of Lermontov are submitted. As a result of analysis it was revealed that in this territory the content of radon on the first floors of buildings depend on existence of the cellar and hydrogeological features of the area.

Stichwörter: Die spezifische Aktivität, die Dosisleistung von Gamma-Strahlung, innere Bestrahlung, natürliche Strahlenquellen der ionisierenden Strahlung, die räumliche Jahresdurchschnittsaktivität des Radons, die Strahlendosis

Key words: Specific activity, osage rate radiation scale, internal radiation, natural ionizing radiation sources, average annual volume activity of a radon, exposure dose.

Einleitung

Heute leisten den größten Beitrag zu der Strahlenexposition die natürlichen Quellen. Wesentlicher Beitrag ist das Radon und sein Zerfallsprodukt.

Der Pegel des Radons schwankt sich in den Räumen der Wohn-, öffentlichen und Produktionsgebäude und der Bauten im großen Rahmen und kann die großen Größen erreichen[1].

Diese Schwankungen sind von einer Reihe von Faktoren abhängig: von der Lage des Gebäudes, der Besonderheiten seiner Konstruktion und der Lüftung, dem Typ der Baustoffe, die beim Bau verwendet waren. Das Radon entweicht sich aus dem Boden unter den Gebäuden heraus, aus den Baustoffen, aus denen die beschützenden Konstruktionen der Gebäude (die Wand, die Decke, den Fußboden) hergestellt sind, und sammelt sich in den Räumen an.

Die Eindringung des Radons und seiner Zerfallsprodukten in die Lungen führt zur Störung der Gesundheit. Das Radon erregt den Lungenkrebs [2-4].

der Radongehalt wird durch die äquivalente gleichgewichte volumetrische Maß der Radonaktivität gemessen, dessen hygienische Normativ beträgt nicht mehr als 200 Bq/m3.

Das Radon ist schwerer als die Elemente der Luft, deshalb sammelt sich das Radon im unteren Teil der Räume beim Fußboden. Deshalb sind die Kinder besonders betroffen.

Die Ergebnisse der Überprüfung der Kinder-vorschulischen und Schul- Einrichtungen in den abgesonderten Subjekten der Russischen Föderation haben gezeigt, dass die Einrichtungen mit übertreffenden hygienischen Normativen zweimal und sogar mehr die Bedeutungen der Äquivalent Gleichgewicht Volumenaktivität des Radons entdeckt haben[5]. Deshalb ist es sehr wichtig und aktuell den Gehalt des Radons in den Kindereinrichtungen zu kontrollieren.

Das Ziel des Artikels ist die Überwachung des Gehalts des Radons durch die Integralmethoden in den Räumen der Kindereinrichtungen in Lermontov.

Lermontov befindet sich in der Region Stawropol und wird sich auf die Ortschaft mit erhörter Radongefährlichkeit bezogen[3]. Diese Stadt befindet sich in der Nähe eines der Objekte der Ex-Uranproduktion LPO “Almaz”.

Methodik

Die Objekte der Forschung sind die Räume in den Kindereinrichtungen in Lermontov. Alle Gebäude sind aus dem Ziegel, mit der zentralen Heizung, mit der natürlichen Lüftung.

Die Integralmethoden wurden als Hauptmethode für die Bestimmung der räumlichen Aktivität des Radons benutzt. Die Grundausrüstung „TREK-REI-1M“ (ТРЕК-РЭИ-1М) wurde als das Messgerät benutzt.

Die Probeentnahme wurde durch die Belichtungsmesser gemacht. Bei der Benutzung dieser Belichtungsmesser wurde passive Entnahme von Luftprobe mit dielektrischem Spurendetektor gemacht, der sich innerhalb der Kammer befand. Zulässige Strahlungsdosen durch die natürlichen Strahlenquellen, die in „NRB-99/2009“ (НРБ-99/2009) festgeschrieben sind, wurden für ökologische und hygienische Bewertung der Ergebnisse benutzt.

Ergebnisse der Untersuchung und Schlussfolgerungen

Bei der Untersuchung wurde der Radongehalt durch die äquivalente gleichgewichte volumetrische Maß der Radonaktivität in Lermontov in den Räumen von Kindereinrichtungen gemacht, die sich in der Nähe von der Absetzanlage befinden.

Nach der Probeentnahme wurde die Auswertung der Detektoren analysiert und Ergebnisse systematisiert. Dann wurde statistische Auswertung gemacht.

Dann wurde die Bewertung der Ergebnisse gestellt. Die Bewertung hat gezeigt, dass alle überprüfenden Gebäude aus dem Ziegel, mit der Zentralheizung, mit der natürlichen Lüftung sind. Alle Gebäude sind im 1954 gebaut worden.

Zunächst wurde geprüft, wie sich das Gehalt des Radons je nach dem jahreszeitlichen Schwanken ändert. Der Beobachtungzeitraum wurde in zwei Periode geteilt: Heizperiode und heizfreie Periode. Die Ergebnisse haben gezeigt, dass die äquivalente gleichgewichte volumetrische Maß der Radonaktivität in den Wintermonaten stabil um 49% höher, als in

den Sommermonaten ist. Deshalb wurden nur die Winterangaben, die besser den Radongehalt charakterisieren, für weitere Untersuchung benutzt.

Weiter wurde die Untersuchung der Angaben je nach dem Stock gemacht. (Tabelle 1)

Tabelle 1.

Die äquivalente gleichgewichte volumetrische Maß der Radonaktivität in der Kindereinrichtungen in Lermontov je nach dem Stock im Gebäude, n=104

Der Stock	Die Anzahl der Proben	$ÄGVA_{Rn}$, Bq/m^3				% der Übersteigen
		max	min	Mittel wert	σ	
1	70	1381	9	258	272	40
2	22	1980	23	483	557	54
3	12	472	8	273	147	67

Die Bewertung hat gezeigt, dass im ersten Stock die Übersteigen der $ÄGVA_{Rn}$ um 40%, im zweiten Stock – um 54%, im dritten Stock – um 67% sind.

Weiter wurde geprüft, wie sich die $ÄGVA_{Rn}$ je nach dem Vorhandensein des Kellers im Gebäude ändert. (Tabelle 2)

Tabelle 2.

Die äquivalente gleichgewichte volumetrische Maß der Radonaktivität in der Kindereinrichtungen in Lermontov je nach dem Vorhandensein des Kellers im Gebäude, n=70

Das Vorhandensein des Kellers	Die Anzahl der Proben	$ÄGVA_{Rn}$, Bq/m^3				% der Überst eigen*
		Max	Min	Mittel wert	σ	
Ja	28	761	39	288	84	46
Nein	42	1381	9	237	71	36
Ingesamt	70	-	-			-
* - die Übersteigender$ÄGVA_{Rn}$ 200 Bq/ m^3vorGesamtzahlderMessungen, in %						

Die Ergebnisse der Messungen haben gezeigt, dass der Mittelwert der äquivalenten gleichgewichten volumetrischen Maß der Radonaktivität in den Räumen der Gebäude mit dem Keller höher in 1, 2 Male ist. Die Maximalangaben in Gebäuden ohne Keller sind aber bedeutend höher: 1381 Bq/m^3. Alle diese Gebäude sind von 1954 bis 1973 gebaut worden. Der Mittelwert ändert sich von 226 bis 761 Bq/m^3. Eine bedeutende Streuung ist nicht zu beobachten. Die höchstwiederholten Übersteigen sind in den Gebäuden, die sich dicht nebeneinander in einer Straße befinden. Das bedeutet, dass die Ursache des Übersteigens die Besonderheit hydrogeologischer Struktur dieser Bezirke sein kann.

Die Hauptschutzmaßnahme der Stadtbevölkerung ist die Überwachung dieser Räume. Bei dem Übersteigen der Dosisbelastungen muss man die Maßnahmen der Reduzierung des Gehalts vom Radon in den Räumen treffen.

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Krylitsyna E. A.

CAUSATION OF MORBIDITY BY ENVIRONMENTAL FACTORS

Master's student of the Department of Forensic Ecology, Ecological Faculty, RUDN University, Moscow
Russia
katiykondr@mail.ru

Abstract: To identify and predict patterns of distribution of non-communicable diseases (season, location, groups of population) an epidemiological modeling has been used. An assessment of the causal relationship between morbidity of children and adult population of Samara, Russia and environmental risk factors over the period 2001 to 2010 revealed a connection of environmentally dependent pathology with air, water and soil pollution.

Key words: epidemiological modeling, morbidity, chronic diseases malignant neoplasm, circulatory system diseases, respiratory diseases

Introduction**.** In this paper we report on the results of a survey and analysis of data on general and primary morbidity of malignant neoplasms, diseases of the circulatory system and respiratory system of children and adult in Samara [1], a city on Volga, in 2001-2010.

The aim of our research is to identify the association of environmentally dependent diseases with contamination of environmental objects by the method of mathematical modeling. Mathematical modeling is, currently, an important tool in the epidemiology of non-communicable diseases [5], including the development of models of various types and in-depth analysis [2; 3; 4].

Materials and methods. We analyzed data about stable objects of the environment (air, water, soil) and the data of statistical reports on mortality. Models of causation of above-mentioned diseases by environment situation (air, water and soil) are made on the results of the longitudinal (dynamic) and transversal epidemiological study. To justify mathematical models criteria of adequacy, statistical significance and, importantly, biological sense have been adopted.

Results of the research. The method of mathematical modeling has been used to establish cause-effect relationship between the incidence of malignant tumors among the adult population and air pollution by suspended solids ($p<0,03$). Correlation has been established between trachea, bronchus, lung cancers and air pollution by formaldehyde ($p<0.005$), as well as between cancer incidence of lymphatic system and haematopoietic tissue and carbon monoxide content ($p<0.005$). The dependence of prevalence of malignant neoplasms from the concentration of nitrates soil contamination ($p<0.01$) is not established. Cancer of the trachea, bronchus, lung of the adult population and concentration of zinc in soil is close to adequate and statistically significant ($p<0,03$), but this model is contrary to the biological sense, because zinc has no carcinogenic effect.

The model of dependence ($R=0.999$; $R2= 99.8\%$) of cerebrovascular disease in adults from content of formaldehyde in the air, and content of zinc in the soil ($R = 0,805$; $R2 = 64.8$ per cent, $p<0.005$) is adequate and statistically significant ($p<0,002$).

The dependences of the incidence of diseases among children from the occurrence of carbon monoxide in the air for respiratory diseases ($p<0,03$), from the presence of iron in water for pneumonia ($p<0,002$), from copper in the soil for asthma ($p<0,002$) have been established.

Conclusions: The mathematical model of causal relationships between disturbances of the health status of the population and the pollution of air, water and soil meets the criteria of adequacy and statistical significance, satisfying modern

concepts of etiology and pathogenesis. This method allows using preventive measures prior to the rise in the incidence in-situ. Even a mathematical model that do not meet adequacy criterion can be useful for a rough estimation of medical and ecological situations.

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Kusova N.K.[1], Dzakaeva Z.[2], Shamshukayeva M.[3], Sulumkhanova H.[4], Okazova Z.P.[5], Blieva Zh.M.[6]

PLANT RESPONSE TO POLLUTION: ASSESSMENT IN GROZNY

Russia
[1]Postgraduate student of the Department of ecology and security The Chechen State Pedagogical University, Grozny
kusovaaminat@yandex.ru
[2,3,4]Student of faculty of Natural Sciences of the Chechen State Pedagogical University, Grozny
[5]Doctor of Agricultural Sciences, professor
The State Chechen Pedagogical University, Grozny
okazarina73@mail.ru
[6]Candidate of Pedagogy, associate professor
The North Ossetian State University, Vladikavkaz

Abstract: The purpose of the present research is to assess pollution in the city of Grozny. The degree of chlorosis and necrosis of deciduous and coniferous plants in the city streets has been evaluated. This naturally available monitoring system proves seasonal negative changes in the middle of summer, vehicle pollution being the main reason.

Key words: phytoindicators, chlorosis, necrosis, urban pollution, the Chechen Republic. Kusova N.H.1., Dzakaeva Z.2., 2 , Sulumkhanova H.2, Okazova Z.P.3, Bliyeva Zh. M.4, 4 associate professor of the North Ossetian state university

Introduction. Plant morphological changes in the as phytoindication parameters are used the last two decades as bio-monitoring method in researches performed in the cities of Europe [2; 3], suggesting that chronic exposure to pollutants changes the leaf structure. So morphological changes of higher plants at the present stage can be the primary indicia of pollution. National monitoring system of most countries includes a wide

range of morphological indicators; anthropogenic influence mapping has been developed.

Premature defoliation, and as a consequence a reduction of photosynthetic surface has a negative impact on the urban environmental situation. It has a strong negative impact on the trees themselves: nutrients deficiency provokes failure in passage through phenophases and premature aging of the trees [1].

Methods and Materials.

The studies were conducted in 2016 in the North Caucasus, in the city of Grozny, the Chechen Republic, Russia. The population is about 270 thousand people.

The purpose of the study is to estimate the degree of environmental pollution by surveying the state of foliage of the arboraceous plants.

Greenery on the main streets of the city has been evaluated, the degree of chlorosis and necrosis of the main deciduous and coniferous tree species has been visually assessed.

Under conditions of excess of water (heavy rains) in the city leaves of the trees in the streets with a high density of traffic are reliably affected, which happens in the early stages of the growing period (the first ten days of June, as a rule). The main forms of foliage destruction are the following:

abundant "honeydew"; loss of turgor; chlorosis; discoloration, which may be in the form of yellowing, browning, bronzing; necrotic lesions. All changes are compounded in hot summer and in late July - early August.

Results and discussion.

Early leaf fall causes defoliation: abscission goes together with reduction in the amount of hormones that come from the leaves and cause inhibition of the base bud development which ensures germination of the next year base buds.

This phenomenon has been observed in Grozny on the busiest roads and streets in dense residential areas in the late summer and early autumn: some horse chestnut trees had got

refoliation and flowering, so that plants got weak when meeting with the cold of the winter. [4]

Visually observed macroscopic changes in leaves are not specific to the vehicle emissions effects, but in the conditions of Grozny, where industrial pollution is not significant, it is possible to assess the role of vehicles as moving sources of pollution damage to the city greenery.

In most, necrotic lesions of the lamina and chlorosis are expressed in the species sensitive to air pollution, such as chestnut and small-leaved linden (*Tilia cordata*) planted in the streets with a maximum density of traffic.

The worst damage of street shrubs and trees occurs in the climbs, junctions and parking, areas of maximum emission concentration. Damage of foliage in the courtyards and squares is proved to be smaller.

Weakened woody plants near the roads with high traffic density are most susceptible to be affected by pests.

Conclusion. Assessment of woody plants leaf area brings more information and becomes an indicator of leaf changes under the influence of vehicle emissions.

Areas in the streets with linden leaf area significantly reduced in comparison with the control variant have been located. The minimum leaf areas have been identified along the roads.

Thus, the visually observable macroscopic changes in the leaves of woody species the most sensitive to pollution are to be used for the intial assessment of the level of vehicle pollution of the city streets.

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Loboda E.A.[1], Kharlamova M.D.[2]

DEVELOPMENT OF MUNICIPAL PROGRAMS AND TERRITORIAL PLANS FOR MUNICIPAL SOLID WASTE MANAGEMENT (MSW) IN DONETSK

Ukraine, Russia

[1] *Master's Student, Ecological Faculty, RUDN University, Moscow*

katrina-loboda@mail.ru

[2] *Ph.D., Associate Professor, Ecological Faculty, RUDN University, Moscow*

mariannach@mail.ru

Abstract: The article deals with the problem of handling solid waste management in the sphere of consumption and housing in Donetsk as well as developing the target municipal program aimed at reducing the negative impact of waste on the environment and human health.

Key words: ecology; solid municipal waste; target municipal program; the territorial scheme for waste management; system of the separate collection

In the modern world a steady tendency towards increasing amount of waste can be traced. So, in Moscow the average coefficient of waste production is 850 kg per person, in Russia on average 450 kg per person, in Ukraine is 300 kg per person. This

is due to the increase in waste specific gravity of glass and plastic packaging. In this regard, it is necessary to seek solutions to the problems of waste production and implement new projects of solid waste handling.

In the city of Donetsk, the problem of accumulation of solid waste becomes more acute every year, and the problem of accumulation of municipal waste remains the most acute one. For the development of the targeted municipal program for municipal solid waste management in the city of Donetsk it is necessary to have details of their morphological composition and seasonal changes in composition. A comparative analysis of the average morphological composition of municipal solid waste in the Donetsk region and Moscow is presented in table 1 [1, 2].

Table 1.The average morphological composition of solid waste in the Donetsk region and the city of Moscow

Waste	The contents in the Donetsk region, %	The contents in Moscow, %
Food waste	39,5	28,5
Paper, cardboard	5,9	28,8
Metals	2,5	5,7
Textiles	2,9	3,1
Plastic	7,9	5,1
Glass	7,4	4,4
Screenings	25,3	19,2
Combustible materials	2,9	1,8
Inert materials	5,7	3,4
Total	100	100

As it can be seen from table 1, the proportion of food waste in the total amount - the maximum for both regions. This indicator is the most important when choosing a method of waste disposal and in the development of the Municipal Waste Management Program. The high percentage of organic substances makes the waste the suitable raw material for biogas or

composting with subsequent production of a high-efficient organic fertilizer.

The basic laws adopted in the Russian Federation, the People's Republic of Donetsk and Ukraine in the field of environmental protection and management of wastes from production and consumption are given in table 2.

Table 2.The legislative framework in the area of environmental protection and waste management

Russian Federation	People's Republic of Donetsk	Ukraine
Federal law of 10.01.2002 N 7-FZ "On Environmental Protection" (edition of 29.12.2015)	Law №38-INS from 30.04.2015 "On Environmental Protection"	The law of the Ukraine "On Environmental Protection" from 25.06.1991 (edition of 24.12.2015)
Federal law of 24.06.1998 No. 89-FZ "On Production and Consumption Wastes" (edition of 29.12.2015)	Law №82-INS act of 10.09.2015 "On Production and Consumption Waste"	The law of the Ukraine "On Waste" from 5.03. 1998 №187/98-VR (edition of 02.03.2015)

In Russian legislation the Federal Law № 404-FZ of 29.12.2015 "On Amendments to the Federal Law "On Environmental Protection" and the Federal Law №89 "On Production and Consumption Waste" expanded the powers of the Russian Federation in the field of waste management and introduced the concept of a regional operator and municipal solid waste.

Since January 01, 2016 in the Federal Law №89 «On Production and Consumption Waste" the concept of municipal solid waste (MSW) is introduced-it is the waste produced in residential areas in the process of consumption by individuals, as well as goods that have lost their consumer properties in the course of their use by individuals in residential areas in order to meet personal and domestic needs. MSW also includes waste produced in the course of activities of legal entities, individual

entrepreneurs and similar in composition to waste produced in residential areas in the process of consumption by individuals [3].

On the basis of the Law №89 "On Production and Consumption Waste" a target municipal program for the management of MSW should include:

1. Creation and development of municipal systems of solid waste;
2. Development of territorial plans for waste management;
3. Establishment of regional systems of accounting and control in the sphere of waste management;
4. Public awareness.

In the Russian legislation in the Federal law №89 instead of the concept of a sanitation scheme the concept of territorial plans for waste management is introduced. Territorial plans of waste management - a set of graphic and textual description of the system of organization and implementation of activities for the collection, transportation, treatment, recycling, disposal, waste disposal [4].

In accordance with the recommendations given in the Government decree of the Russian Federation "On requirements to the composition and content of territorial plans for waste management, including municipal solid waste" a territorial scheme of waste management should include [4]:

1. Data of the main points for gathering and storing waste.
2. Data on existing and potential facilities of waste management (IPU, landfills, facilities for waste, etc.).
3. The balance of the quantitative characteristics of the formation, processing, recycling, disposal, waste disposal.
4. The flow chart of municipal solid waste from sources of their formation to objects used for the processing, recycling, disposal, waste disposal.
5. The transport network of waste recycling, designated recycling and disposal.

As a result of the analysis of existing legislation in the area of environmental protection and waste management in the

Russian Federation (RF), the Donetsk People's Republic and Ukraine, it was found out that in the legislation of the Russian Federation the most comprehensive approach to solving the problem of MSW was provided. In this regard, when developing the targeted municipal program for the city of Donetsk and territorial circulation circuit of production and consumption waste the author relied mainly on the legislation of the Russian Federation.

The main factors affecting the peculiarities of territorial schemes are population density and proximity to human settlements. Therefore there is a need for the removal of the technical points of the waste management or "technoparks", including sorting lines, primary and biothermic processing and sanitary landfill for the "tails", outside the urban settlements, which leads to an increase in MSW transportation costs.

Table 3. The amount of waste entering landfills in Donetsk

Waste	The volume of waste entering the landfill t/year *
Food waste	113 420,61
Paper, cardboard	16 941,31
Metals	7 178,52
Textile	8 327,08
Plastic	22 684,12
Glass	21 248,42
Screenings	72 646,62
Combustible materials	8 327,08
Inert materials	16 367,04
Total	287 140,8

* the population of the city of Donetsk is 957136 people (2015).

To choose the most rational way of waste management and to develop territorial schemes for the treatment of MSW in the city of Donetsk, the amount of waste entering the landfills was calculated in accordance with its morphological composition.

Table 3 shows the results of calculation of the volume of waste entering landfills in the city of Donetsk.

Donetsk is the largest industrial center of the Ukraine. A characteristic feature of the economic complex of Donetsk is a diversified industry structure. Industry is represented in almost all sectors of economy: black and nonferrous metallurgy, coal, chemical and coking industry, heavy engineering. Along with the traditional sectors of heavy industry in recent years light, food, woodworking industry, mechanical engineering have been developing and agriculture is developing significantly in the district of Donetsk.

As it can be seen from table 1 and table 3, most of the MSW in the city of Donetsk consists of the organic fraction (food component + paper, only 45,4%), so the optimal direction for the recycling of urban waste is a complex biological processing of MSW, together with wastes from agricultural production by methane fermentation to get biogas and heat and electricity to meet the needs of the population, obtaining a valuable organic fertilizer. The remaining non-utilized part of the "tails", which is a screening, must be received at the landfills for disposal.

In the city of Donetsk (the area is 385 km^2, the population density of 2425 people per 1 km^2) there are two existing MSW landfills, which today are overfilled and consequently must be closed and recultivated, and an illegal waste dump near almost every settlement. Fig. 1 is a schematic map showing the location of the existing landfills in Donetsk.

Figure 1. The location of existing dumps of Donetsk

Figure 2 shows the estimated location of the new sanitary landfill of municipal solid wastes in the city of Donetsk.

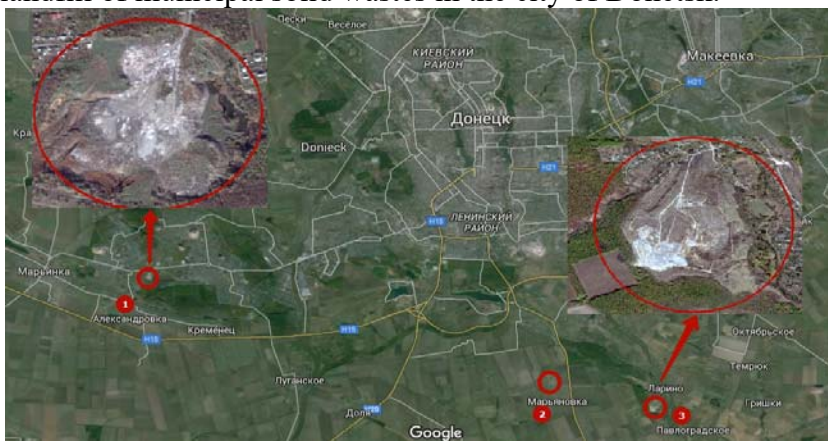

Figure 2. - Model location of the intended MSW landfill in the city of Donetsk

As a result of the development of the targeted municipal program for the treatment of MSW in Donetsk and implementation of territorial schemes the following results are obtained:

1. the improvement of the overall ecological and sanitary-epidemiological situation on the territory of Donetsk by reducing the levels of pollution of groundwater and soil waste and the contained harmful substances;

2. the extraction of valuable waste fractions of plastic, ferrous and non-ferrous metals totaling to 40% from waste;

3. improving the quality of services for the collection and disposal of MSW;

4. maintenance and development of a favorable environment for living in the city of Donetsk.

The development of the territorial (municipal) waste treatment scheme is a complex multistage procedure, however its implementation could solve a lot of problems and challenges in the field of housing and environmental protection. Thus, the territorial scheme for the treatment of MSW is a technical instrument for solving problems in the field of treatment of MSW.

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Matserova A.V.

LOS CONTAMINANTES ORGANICOS PERSISTENTES

Rusia

[1]*estudiante de grado (4 curso) de la Facultad de Ecológía de la Universidad Rusa de la Amistad de los Pueblos (URAP), Moscú,*

angeuinka07@gmail.com

Abstract. This article describes the problem of use of persistent organic pollutants (POPs): their types, the impact on the environment and human health.

Key words: Persistent organic pollutants, POPs, chemical substances, pesticides, Ecology, problem, environment.

Resumen: En este artículo se aborda el problema de uso de los contaminantes orgánicos persistentes (COP): sus tipos, el impacto sobre el medio ambiente y la salud humana.

Palabras clave: Contaminantes orgánicos persistentes, COP, sustancias químicas, pesticidas, ecología, problema, el medio ambiente.

Los contaminantes orgánicos persistentes

Los contaminantes orgánicos persistentes (COP) son sustancias químicas que permanecen en el medio ambiente, son transportados a grandes distancias, se bioacumulan a través de la cadena trófica y suponen un riesgo de causar efectos adversos al medio ambiente y la salud humana. Los COP incluyen pesticidas

como el DDT, productos químicos industriales como los bifenilos policlorados (PCB) y productos químicos generados involuntariamente como dibenzo- p-dioxinas policlorados (PCDD) y dibenzofuranos policlorados (PCDF). [1]

El número inicial de los COP reconocidos como perjudiciales para los seres humanos y los ecosistemas, son 12 - la llamada "docena sucia ". Estas sustancias se pueden dividir en tres categorías :

• pesticidas (aldrina y dieldrina, clordano, DDT, endrina, heptacloro, hexaclorobenceno, mirex, toxafeno) ;

• productos químicos para fines industriales (hexaclorobenceno, bifenilos policlorados (PCB)) ;

• subproductos (hexaclorobenceno, dibenzodioxinas policlorados (PCDD) y dibenzofuranos policlorados (PCDF), los PCB). [2]

Los contaminantes orgánicos persistentes son compuestos químicos resistentes de baja volatilidad que pueden permanecer en el ambiente por mucho tiempo sin descomponerse. [3]

Ellos pueden existir en diversas formas y pasar de un componente a otro entorno, que les permite recorrer a largas distancias desde el contaminante original. Por lo tanto, algunos COP viajan a distancias considerables cuando se evaporan de la superficie del suelo o el agua. Luego regresan a la superficie de la tierra con el polvo, nieve, lluvia o niebla. COP pueden ser transportados por los océanos, ríos, lagos o, más raramente, por los animales migratorios. [4]

Los COP afectan negativamente al medioambiente y a la biodiversidad. Ellos implican una reducción de las populaciónes, la propagación de enfermedades y anomalías en muchas especies de animales: anomalías de comportamiento y defectos de nacimiento en peces, aves y mamíferos.

Los Contaminantes Orgánicos Persistentes entran en el organizmo del ser humano a través de los alimentos, especialmente con los que son ricos en grasa: carne, pescado, lácteos, etc.[5]

Acumulando en el cuerpo humano, los COP pueden causar graves daños a la salud:

- neoplasias malignas y cáncer
- toxicidad para la reproducción
- enfermedades de la piel
- trastornos metabólicos y hormonales
- daños del sistema nervioso central y periférico
- daños hepáticos
- trastornos del sistema inmune
- anormalidades en el sistema respiratorio y otros trastornos.

Además, acumulando en el cuerpo de la madre, los COP pueden afectar de manera adversa al feto, penetrar a través de la placenta y causar trastornos de desarrollo de él.[6]

En algunas regiones el problema de los COP puede ser más preocupante, por ejemplo en el Ártico. Llegando en el Ártico, los COP se acumulan en los sistemas biológicos y representan una amenaza seria contaminando el aire, el agua, los animales y la gente local. El problema aún es más serio debido a que la dieta de los pueblos indígenas contiene tradicionalmente una gran cantidad de grasa que el cuerpo necesita en condiciones extremas del Extremo Norte. Debido al hecho de que los COP se acumulan en el tejido graso de animales, el ser humano es el más expuesto a los contaminantes orgánicos persistentes, puesto que por la ley de la biomagnificación, la concentración de sustancias aumenta a medida que la especie se asciende en la cadena alimentaria.

En 2011, el PNUMA reconoció que la reforma de productos químicos debe llevarse a cabo en el contexto del creciente impacto del cambio climático sobre la liberación de sustancias químicas, su transferencia, disolución, los niveles de exposición y toxicidad. Los autores del informe del grupo de expertos del Programa de las Naciones Unidas para el Medio Ambiente (PNUMA) y la Vigilancia y Evaluación del Ártico, que se titula "El cambio climático y los contaminantes orgánicos

persistentes: Los efectos del tiempo", concluyen que el aumento de la temperatura aumenta las emisiones primarias de los COP. También ellos demostraron que el aumento de los niveles de exposición a los COP se debe a la evaporación secundaria y liberación de contaminantes orgánicos persistentes en el derretimiento de los glaciares y el permafrost, a través de inundaciones de tierras contaminadas, vertederos y el vertido de tierra, y, como consequencia, se incrementa la consetración de los COP durante la transición de su estado líqudo al estado gaseoso y llegando de agua a la atmósfera.[7]

Por lo tanto, el problema de los contaminantes orgánicos persistentes se convierte en muy importante para la sociedad moderna. Los COP tienen un impacto significativo sobre el medio ambiente, la biodiversidad y la salud humana, incluida la salud reproductiva. Pero el hecho de que pueden existir sin descomposición durante mucho tiempo los hace aún más peligrosos, ya que es un problema para las generaciones futuras.

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Meleshko A.A.[1], Erokhin S.A.[2], Zaginaev V.V.[3]

FACTORS OF MORAINE-DAMMED LAKE OUTBURSTS: NONSTATIONARITY OF THE TIEN-SHAN LAKES IN KYRGYZSTAN UNDER CLIMATE CHANGE CONDITIONS

Russia, Kyrgyzstan, Kyrgyzstan
[1]Postgraduate student, Ecological Faculty
meleanna@yandex.ru
[2]Candidate of Sciences. Senior Researcher. Institute of Water Problems and Hydropower
erochin@list.ru
[3]Candidate of Sciences. Researcher. Institute of Water Problems and Hydropower
zagivitjob@gmail.com

Abstract. The outburst susceptibility of moraine-dammed lakes is associated with a range of factors. Among them the occurrence and evolution of moraine-glacial complexes, the processes of buried ice thawing and nonstationarity of the lakes associated with the regime of channel blocking and resulted water level increase have a crucial effect. A rapid growth of lake Petrova, increasing number of Adygene lakes and Teztor events show, that moraine dams and related intramoraine outlet channel system are very sensitive systems to climate changes and their regimes specify the development of non-stationary lakes.

Key words: Moraine-dammed lakes, dam failure, moraine-glacial complexes, intramoraine outlet channels, buried ice thawing, non-stationary of lakes.

Introduction. Shrinkage and retreat of glaciers often result in the expansion of glacial lakes which produce glacial lake outburst floods (GLOFs). Moraine-dammed lakes are rather unstable and prone to outburst, and refer to young geomorphological landform, mainly linked to glacier retreat regimes [3, p. 390]. There is a range of factors affecting the stability of lake dams and contributing to the moraine-dammed lake failure hazard. Many previous studies have been put into assessing the factors affecting the lake dam failure, however such

factor as nonstationarity of moraine-dammed lakes is poorly described.

Methodology. In this paper we report on the results of a long-term field survey and analysis of historical events conducted in Kyrgyzstan by the Engineering Geological Agency and Institute of Water Problems and Hydropower to describe the main factors of moraine-dammed lake failure.

Results. Monitoring of the outbreak prone moraine-glacial lakes shows that for the recent 65 years in Kyrgyz Tien-Shan GLOFs resulted in devastating debris flows from moraine-dammed lakes, among which 12 events were triggered by nonstationary lake failures (Teztor; Isha; Angusai; Suiuktor; Takytor; Jalpaktor; Zyndan; Chetendy-Jersuiskoe, etc.) and 7 by stationary lake failures. [2]. Modern climate change has a significant impact on the moraine-dammed lake outburst hazard due to its effect on glaciation degradation. Three main factors are responsible for the formation, development of moraine-dammed lakes and the degree of hazard of their failure.

The 1st factor. Formation of moraine complexes (can be open or enclosed): for the recent 40 years around 20 lakes have occurred in Adygene moraine-glacial complex.

The 2nd factor. Buried ice thawing. Thermokarst processes develop intramoraine channels in the lake's dam, through which these lakes drain and break through. The process of evolution of conduits may result in a roof collapse and are then blocked, allowing the water to accumulate and rupture again. For example, there are numerous thermokarst lakes and funnels developing on the Petrova lake's dam in the Naryn riverhead. The funnels rapidly develop, extend, fill up with meltwater forming new bays of the main lake extending its surface area and volume.

The 3rd factor. A growing number of non-stationary lakes. These are the lakes, which episodically filled with water, once the channels have been blocked; and when the water level increases in a lake basin (the volume may reach up to hundreds of thousands of cubic meters), the blocked channel ruptures,

producing the lake outburst floods. Typical example is non-stationary lakes in the Teztor moraine-glacial complex on the northern slopes of the Kyrgyz Ridge in valley of Ala-Archa river. Three lakes were observed to be filled with water in the years 1953, 1988, 1995, 2003-2004 and 2010-2012 [1; 2]. In 2004 the lake burst through the ice grotto at the foot of the glacier's. It started to fill again in 2010. In 2012, it had 100 thousand m^3, the moraine dam did not resist, the blocked dam channels ruptured and the water stream went through the intramoraine channel and discharged out 70 m down the basin. (fig. 1).

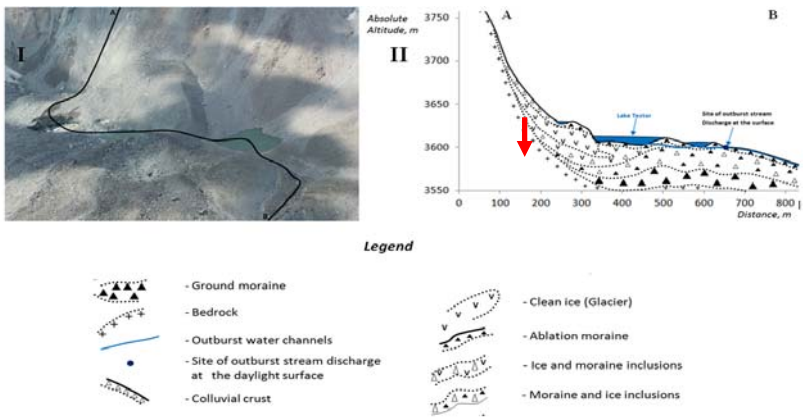

Fig.1. I - Profile line of the moraine-glacial complex Teztor between points A and B; The arrow indicates the GLOF discharge outlet;
II - Section of the Teztor moraine-glacial complex along the AB profile line.

Conclusion**.** Formation of moraine-glacial complexes results in the formation of new moraine-dammed lakes with a developed intramoraine drainage channel system which is very sensitive to climate change. Buried ice thawing increases the surface and level of a lake and its outburst hazard. Repeated blocking of channels resulting in water level rise in lakes and its consequent repeated failure which specifies the occurrence of nonstationary lakes.

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Montes Ortega Mery Elizabeth

EL IMPACTO DE LA EXPLOTACION DE LOS SECTORES ECONOMICOS NATURALES EN EL DESARROLLO SOSTENIBLE DE LA REPUBLICA DE GUATEMALA.

Estudiante de primer año de magisterio de la Facultad de Ecología
Supervisor: Candidata a las ciencias biológicas Kurbatova A.I.
Universidad Rusa de la Amistad de los Pueblos, Moscú
mery.montes.ortega@hotmail.es

Abstract: This article will consider the impact of exploiting natural resources and its causes in the sustainable development of the republic of Guatemala.

Key words: Natural resources, sustainable development, economy, Guatemala.

Resumen: En el siguiente artículo se analizará el impacto de las diferentes actividades económicas en el desarrollo sostenible de Guatemala.

Palabras claves: Recursos naturales, desarrollo sostenible, economía, Guatemala.

La economía guatemalteca es la más grande en América Central. El principal sector económico es la agricultura, siendo Guatemala el mayor exportador de cardamomo en el mundo, el quinto exportador de azúcar y el séptimo de café. La actividad económica de Guatemala se ha mantenido estable en los últimos años, en el 2015 el PIB creció un 4% a pesar de la crisis financiera. [1]

La tasa de crecimiento del consumo energético crece con un promedio anual del 12% lo que nos indica la baja tasa de crecimiento del PIB y la gran cantidad de consumo de energía. La intensidad energética está relacionada y depende directamente del valor del PIB y no de la cantidad de energía consumida. Por otro lado, el crecimiento demográfico implica un aumento en la demanda de servicios sociales, empleo, vivienda e infraestructura, así como el uso de los recursos naturales. [1]

Guatemala está ubicada en una zona climática, en un istmo estrecho entre dos continentes y entre dos océanos (el Pacifico y el Atlántico), estas características convierten al país en una zona geográfica de alto riesgo y vulnerabilidad a los fenómenos naturales. El aumento en el estado de la crisis ambiental, puede conducir a un aumento en las tasas de mortalidad, la falta de alimentos, vivienda, y los recursos financieros necesarios para remediar las consecuencias de los desastres ambientales. El acelerado proceso de degradación de los sistemas naturales conlleva al deterioro de la situación socioeconómica del país, que conducen a la pérdida de los recursos naturales, los cuales son la base para el desarrollo sostenible del país. [2]

En Guatemala se concentran 7 biomas y 14 eco-regiones, lo que la convierte en un país con una gran biodiversidad, el número de animales vertebrados es de aproximadamente 3025 tipos y 6733 especies de flora, de las cuales 15% son endémicas. Una de las principales amenazas a la biodiversidad es la pérdida de la cubierta forestal, que afectan a la integridad de los ecosistemas y especies, y el comercio de vida silvestre. [3]

La cubierta forestal en el 2015 alcanzó 3.540.000 ha. (33% del territorio del país.) Durante el periodo 2007-2015 la tasa de deforestación es de 2,8% a un ritmo anual del 0,4%. El impacto de la deforestación y la degradación forestal se puede dividir en: el impacto sobre los ecosistemas y el impacto en la economía nacional. Si tenemos en cuenta los impactos ambientales de la degradación de los bosques entre 1950 y 2012, el área cubierta por manglares, latifoliadas, bosques mixtos y de coníferas disminuyó en un 62%, 36%, 34% y 29%, respectivamente. [3]

El uso incorrecto y el mal mantenimiento de los diversos sectores de la economía, afectan también a la condición de los recursos hídricos en Guatemala. Esto conduce a efectos perjudiciales para el medio ambiente debido a la descarga de aguas residuales sin tratamiento, que es una de las mayores fuentes de contaminación del agua. En la actualidad, el sector de la energía hidroeléctrica en Guatemala ha ido mejorando notablemente, y se ha convertido en una buena área de inversión. Actualmente existen 10 centrales hidroeléctricas en operación, de los cuales destaca la energía hidroeléctrica Chixoy, situada en Alta Verapaz. [4]

Conclusiones

• Con base en el análisis de los criterios de sostenibilidad, se reveló que el desarrollo sostenible en Guatemala es débil, es decir, no está dirigido a la conservación del capital material, humano y natural, el crecimiento económico se realiza con bajos indicadores sociales y a costa de la degradación del medio ambiente.

•Sin embargo, Guatemala tiene potencial hidroeléctrico significativo, con una tasa de crecimiento anual del 10%, disminuyendo así el consumo de fuentes de energía no renovables y reducir la dependencia de los hidrocarburos importados.

• Se estableció que las principales causas de la pérdida de la cubierta forestal, ecosistemas y la biodiversidad se basa principalmente en dos variables asociadas con el crecimiento de

la población: la demanda de energía de bajo coste (leña y carbón) y la urbanización, y la demanda de tierras para la agricultura.

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Motakova D.D.

Zum Problem des Lachsaussterben auf der Insel Sachalin

Russia
Student, Ecological Faculty
daria.motakova@gmail.com

Annatation:. On the island Sakhalin there exists big problem with salmon fishing. There is to many reasons and «ecological guard of Sakhalin» has carried out the researches.

Annatation:. Auf der Insel Sachalin existiert großes Problem mit Lachsfischerei. Es gibt vielen Gründen und « ökologische Wache des Sachalins» hat die Forschungen durchgeführt.

Key words: salmon fishing,Sakhalin, fishery resources, Keta population, pipe installation, Sakhalin Environment Watch, salmon breeding bottom

Stichwörter: Lachsenfischerei, Sachalin, Fischressoursen, Ketapopulation, Aufbau der Rohrleitung, Ökologische Wache des Sachalins, die Lachsenstelle

Inhalt:

Sachalin ist die größte Insel im Fernosten Russlands. Die Insel wird von Ochotskische und Japanische Meeren umspült und durch die enge Tatarenge und Nevelskijenge vom Kontinent geteilt. Laperusaenge teilt die Insel von der japanischen Insel

Hokkaido. Auf der Sachalininsel steht das Problem mit Fischressourcen der Region sehr akkut. Die Grundlage der Wirtschaft beträgt Lachsfischerei. Es gibt viele Ursachen, warum Fische in Sachalinischen Flüssen fehlen.

Die Organisation «Ökologische Wache des Sachalins» hat eine Forschung im See Tunaischa durchgeführt. Das Objekt der Forschung war das Fischfehlen. Die Fachleute inspizierten natürliche Lachstellen in Seen Kommisarowka, Kamenka, Schpakowka und im Flußarm vom See Dobretskoe. Früher waren dort immer gesunde Keta-populationen. Heutzutage existiert wilder Fisch fast in keinen Flüssen.

Es ist mit der Anlage der Sperre verbunden, die den Fisch zahlt. Das ist für gewerbliches Ausfischen von Keta im Flussarm Krasnoarmeiskaj notwendig, der den Tunaitchasee mit Ochotkischem Meer verbindet, um die Auswinterung des Fisches in Seen zu verhindern. Nach Angaben Pruef- und Forschunsinstitut der Fischwirtschaft- und Ozeanographie war festgestellt, dass sich das Problem der Anhäufung von Keta in Seen, die in den See Tunaitcha zufließen. Die Anhäufungen der Fische haben die nötige Anzahl des Lachses übertroffen.

In Wirklichkeit wurde nach den Forschungen von Seen und Küsten wurde festgestellt, dass es dort überhaupt kein Fisch gibt. Man kann nur selten Einzelfisch oder Paare beobachten. Es sind auch die Spure der Fischwilderei vorhanden. Die Wissenschaftler haben 300 Meter des Betts den See Kamenka erforscht. Dort haben sie nur 15 lebendige Fische gefunden. Das ist weniger, als 10% von Nötiges.

Große Fischansammlungen sind nicht in Flüssen, sondern im See, in dem Ort, wo der Fluss Schpakowka einmündet. Dieser Fisch kommt in mündungsnahen Förden und kommt in gleichen Anzahlen heraus. Es kommt zu, weil der Fisch in der Unfreiheit geboren ist. Der Fisch kommt in heimischen Fluss wieder. Das geht so wegen starken Effektes von Schlussfolgerungen.

Auf solche Weise wurde also klar, dass es die Bedrohung „der Überbevölkerung“ von Fischen nicht gibt. Dabei gibt es

aber Mangel von Keta. Das ist eine direkte Bedrohung von der weiteren Existenz des gegebenen Fisches. Deswegen kann man die Anlage der Speere, die den Fisch zählt, für illegal halten.

Auf dem Sachalin führt man zu Zeit das aktive Bauschaffen von «Sachalin-2». Das wichtigste Element von «Sachalin-2» ist Aufbau der Rohrleitung. Die Rohrleitung hat die Länge 850km, wird durch Erdbebengebiet gebaut und 1103 Flüssen und Flüsschens durchkreuzt. All diese Flüsse sind die Laichenstelle von Lachsen. Es gibt noch ein sehr wichtiges Faktor und zwar der Aufbau eines Flüssiggasbetriebes und Verladungsterminal in der Siedlung Prigorodnie. Wegen des Aufbaus braucht man 1 Mio. Tonnen von Boden ins Binnenmeer Aniva auszuwerfen. Trotzdem existiert ein alternatives Auswerfen von Abfällen außer Binnenmeer Aniva, Bauführer haben darauf aber verzichtet.

Das Binnenmeer Aniva ist das wichtigste fischwirtschaftlic he Reservoir. Das Bodenwerfen führt zur Vergrößerung der Wassertrübung und Sauerstoffmangel im Wasser wegen Säuerung organischen Stoffes des Bodens. Dabei wird der Export-Terminal Einwanderungen von Lachs stören.

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Okpara D.

STRATEGY FOR SUSTAINABLE DEVELOPMENT OF NIGERIA IN OIL SPILLS, GAS AND WASTE RESOURCES MANAGEMENT

Nigeria
Postgraduate student, Ecological faculty
RUDN University, Moscow
donatusokpara@yahoo.com

Abstract: Strategy for sustainability in development of any nation and Nigeria in particular reflects the understanding that current global economic growth and development cannot be sustainable with the current production and consumption patterns. Therefore, the current situation of Nigeria concerning resource efficiency is examined. Final raw material extraction and the disposal are analyzed. Stakeholders' role and innovations waste management issues are discussed.

Key words: oil spills, wastes resources management, sustainable development, policies and regulations, Nigeria.

Introduction**.** Globally, more resources are being extracted to produce goods and services than the planet can replenish [3 p. 9]. Humans depend on industries and technology for survival, the need to redesign means of balancing the ecosystem is paramount for ourselves and for the unborn generation. This calls for international collaboration to synergize and formulate implementable policies where all that is concerned would be held accountable of misconducts. Participation is universally required.

The Nigerian government is not doing enough to handle current waste management from oil exploration and exploitation. Evidence abounds in Niger Delta soil [1]. The dilemma of profit and environment is explored [2]; issues of systemic lack of sustainability indicated misplaced priorities in the form of governance, rules and regulations. The present research concerns understanding why stakeholders do not enact waste management procedures and government innovations in oil producing regions in Nigeria.

Methodology**.** The methods used were qualitative and were supported by interviews, personal opinions of individuals, articles, news and media, scientific journals of international repute, organizations and corporations in the oil sector (Figure 1).

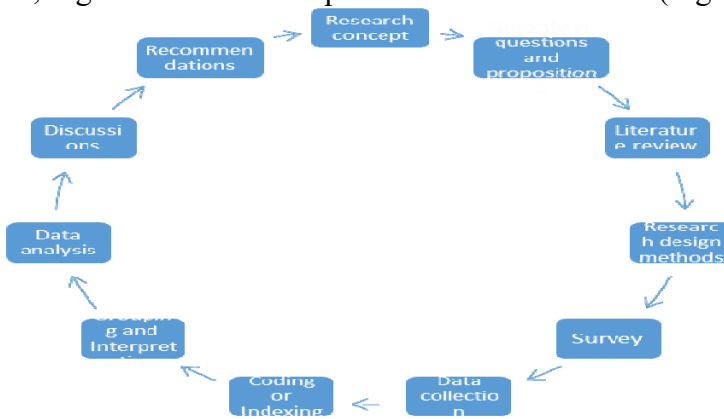

Figure 1. Topical environmental pollution in Niger Delta. Waste minimization

These gave a 360 view enabling objective views from literature, individual, experts, cases study and surveys.

Results**.** The research focus lays emphasis on the need to recognize waste management methods as the prevention of waste material being created, also known as waste reduction. These methods of avoidance include reuse of second-hand products, repairing broken items instead of buying new, designing products to be refillable or reusable. The Polluter pays principle is a principle where the polluting party pays for the impact caused to the environment.

Findings revealed that transition plans are required to reduce pollution, manage waste, rebuild lost land, apply best practices and indeed give the affected communities hope to live again. There is also strong indication from the data collected that

such measures would save the Nigerian government more money and afford it time to refocus attention.

Regulatory agencies, government and companies are encouraged to improve their environmental efficiencies by eliminating waste through resource recovery practices, like recycling materials and applying sustainable principles.

Conclusion**.** Shifting towards green products innovation is the key to sustainable development of both oil and gas in the environment. A transition plan of action is an ideal step towards future opportunities and performance. This transition must recognize the uncertainty the sector is facing today, understanding the need for flexibility approach and tactics, solutions to rehabilitate retarded social, economic and environmental problems accrued in the region. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the unrecoverable material.

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Tsvetkova A.Y.

DEVELOPMENT OF MEASURES TO REDUCE THE IMPACT OF DATA CENTER AIR EMISSIONS ON THE TERRITORY OF THE « KURCHATOV INSTITUTE» RESEARCH CENTER, MOSCOW.

Russia
Master's student, Ecological Faculty
RUDN University, Moscow
tsvetkova.nst@gmail.com

Abstract: The problem of atmospheric air pollution with the data center building on the territory of Kurchatov Institute" is considered. The analysis of the situation as well as a comparative assessment of existing technologies reducing the impact of diesel generator emissions on the environment was carried out. As a result we picked the optimal method of solving the problem - the replacement of obsolete unreliable equipment with new one that meets all environmental standards.

Key words: Air pollution, anthropogenic impact, electricity, data center, diesel generator sets, diesel rotary uninterruptible power supply

Introduction. The problem of air pollution has been acute for decades.

The object considered in this paper is located in one of the most sustainable Moscow districts the North-Western district of Shchukino [1]. Being the resident of this district I consider it very important to find a solution for the existing on the territory of the "Kurchatov Institute" research center.

The aim of this work is analysis of available ways to minimize the negative impact of the emissions of the power supply system of the datacenter and choosing of the optimal solution.

Methodology. The object of study in this paper is Data Center, it is designed for computers, electronic and other means of reception, transmission, processing and storage of information. The data center was established on the basis of buildings № 119 and № 63 on the territory of "Kurchatov Institute" research

center. Building No. 63 serves as a subsidiary to provide data center uninterruptible power supply upon the occurrence of an emergency and disabling centralized power.

Currently, the backup power supply is provided by DC diesel generator sets (DGS). In No. 63 there is a distribution device that supplies power to 8 diesel generator sets (DGS). Currently installations of AD-1200C-T400 1PM18 production made in Russia are used. The maximum single engine power is 1500kVt [2].

Results of Calculations

The results of the dispersion calculation are presented in table 1, in the residential area of the plant maximum permissible concentration of NO_2 (4,84 MPC), CH_2O (1.4 MPC) and CO (MPC to 1.04) were recorded [3]. Those exceeding the can be explained by the obsolete sources of backup power data Center, working 1 time a week for 20 minutes. Exceedances of pollutants in the air are extremely dangerous to the health of people living near the enterprise, this problem should be solved urgently [4].

Upon making the decision on the replacement of obsolete equipment calculation of emissions and their dispersion was carried out. The results show that all indicators significantly decreased significantly and no longer pose a threat to the population.

Table. 1 the Results of calculation of dispersion to the replacement of the DGU

Code	Name of the substance	The maximum calculated concentration (in shares of MPC)	The concentration in shares of MPC	
			On the border of the enterprise	At the nearest residential area
0301	Nitrogen (IV) oxide (Nitrogen dioxide)	4,84	4,79	4,84
0304	Nitrogen (II) oxide (Nitrogen oxide)	0,63	0,63	0,63

0328	Carbon black (Soot)	0,51	0,50	0,51
0330	Sulfur dioxide	0,27	0,26	0,27
0333	Hydrogen sulfide	The calculation is not appropriate		
0337	Carbon monoxide	1,04	1,03	1,04
0703	Benzo(a)pyrene	0,39	0,39	0,39
1325	Formaldehyde	1,4	1,38	1,4
2732	Kerosene	0,38	0,38	0,38
2754	Limit hydrocarbons C_{12}-C_{19}	The calculation is not appropriate		

Results and conclusion

When considering the range of environmental technologies designed to reduce the amount of pollutants emitted from diesel plants, it was concluded that eliminate exceedances for NO2, CO and CH2O one single technology is not enough, because none of them has a sufficiently high degree cleanse [5]. Therefore combining at least two technologies should be a solution.

In conclusion, the main criterion in the choice of measures was not even the imperfection of a different kind of catalysts, but the fact that the installed DGS are outdated and unable to provide a reliable data storage facility for the "Kurchatov Institute" research center.

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Tsvetkova V.R.

NATURAL DISASTER TRENDS

Russia,
Bachelor's student, Ecological Faculty
RUDN University, Moscow
Candyholic26@gmail.com

Abstract: The article contains the description of natural disaster trends and their causes.

Key words: natural disaster, disaster trends, calamities, economic damage, global process, techno-natural hazard.

On the Earth's surface and the lower layers of the atmosphere there goes the development of a variety of complex physical, physico-chemical and biochemical processes involving sharing and mutual transformation of different types of energy. Energy sources are the processes of reorganization of substances occurring inside the Earth, the physical and chemical interaction of its outer shells and physical fields, as well as the heliophysical influence. These processes are the basis of the evolution of the Earth and the natural environment on it. Geodynamic processes cause the development of such dangerous phenomena such as earthquakes, volcanic eruptions, tsunamis, landslides, mudflows, floods, cyclones, hurricanes and others.

It is not possible for men to suspend or cancel the course of these transformations.

One of the important things is the change of the total number of natural disasters in the analyzed period. As it can be seen from Fig.1, the number of natural catastrophic events in the world tends to increase.

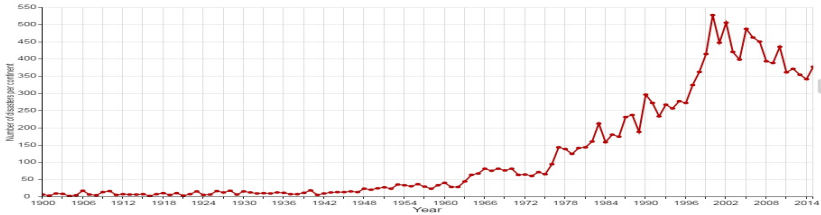

Fig.1. Total number of reported natural disasters between 1900 and 2015 [2]

The most widely spread calamities in the world are tropical storms, floods, earthquakes and drought (Fig.2).

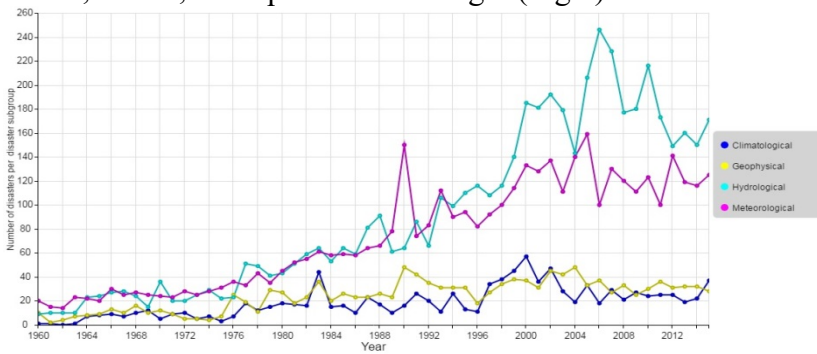

Fig.2. Number of reported natural disasters per disaster subgroup between 1960 and 2015 [2]

In the world there are no regions without major natural disasters occurred. Devastating natural phenomena with maximum economic damage is on the Asian continent (39% of the total number of major accidents), then it goes in South and North America (26%), Europe (13%), Africa (13%), Oceania (9%) are particularly common (Fig.3).

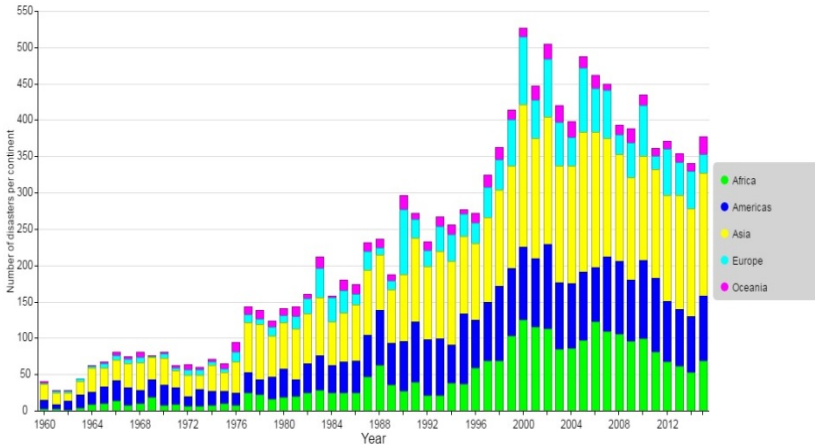

Fig.3. Number of disasters per continent between 1960 and 2014 [2]

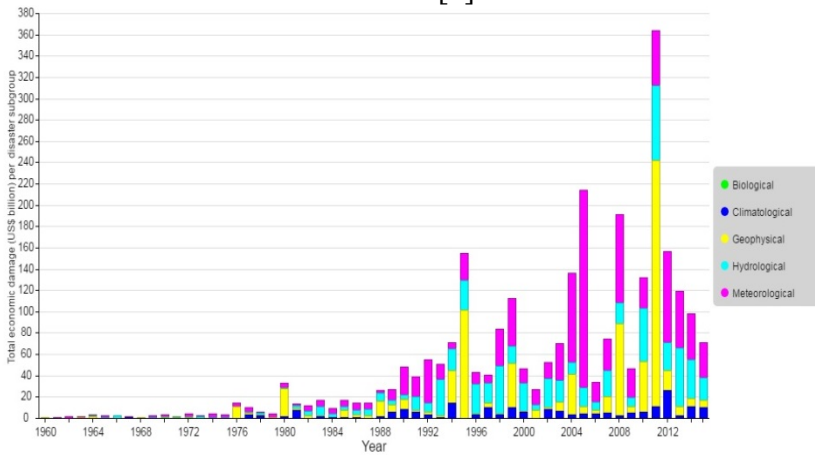

Fig.4. Total economic damage caused by reported natural disasters between 1960 and 2014 [2]

It should be mentioned that these figures relate only to the five kinds of natural disasters. When taking into account all the other dangers, the value will increase significantly.

Economic losses from natural disasters grow rapidly (Fig.4). In general, for the last 35 years, economic losses from natural disasters in the world increased by 74 times (excluding

the inflation of the dollar during this period): they accounted for just over 1 billion in the 60-ies in the year, in the 70 - 4.7, in the 80 - 16.6 as well. There is still a tendency of growth of economic damage.

GLOBAL PROCESSES BASED ON NUMBER OF ACCIDENTS GROWTH

Increased number of natural disasters in the world related to a number of global processes in the social, natural and technological fields that cause the intensification of natural hazards and reducing the safety of people in the world. There are some of these processes:

1) *Population growth*;
2) *Technological impact*;
3) *Climate warming*.

Until recently, the efforts of many countries in disaster reduction was aimed at eliminating the consequences of natural phenomena, victim assistance, the organization of rescue operations, the provision of material, technical and health services, supply of food, etc. However, an irreversible increase in the number of catastrophic events and the associated damage makes these efforts less effective, and puts forward a new task as a priority: prediction and prevention of natural disasters. The basis of the new concept is necessarity to take a "global culture of prevention", based on scientific forecasting of future disasters. "It is better to prevent a natural disaster than to eliminate its consequences" - is written in the outcome document of the Yokohama Conference. International experience shows that the costs of forecasting and preparedness to natural extraordinary events up to 15 times less than the economic damage caused by disasters [1].

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Tsvetkova Yu.[1], Bayeva Y.I.[2]

ENVIRONMENTAL ASPECTS OF BARK DISPOSAL

[1]Master's student, Ecological Faculty
RUDN University, Moscow
yuliyatsvetkova95@gmail.com
[2] Candidate of Biological Sciences, Ecological Faculty
RUDN University, Moscow
baeva_yulya@mail.ru

Abstract: The article investigates the effect of temperature and mineral supplements on the rate of decomposition of bark of different species. It is shown that the intensity of CO2 release correlated with the air temperature and is caused by the relation of organic and mineral components.

Keywords: bark, substrate, mineral supplements, the decomposition of the bark.

As of today Russia is one of the leading countries in volume of lumber production.According to the Food and Agriculture Organization of the United Nations (FAO), in 2014, Russia's share was 5.5% of the total global timber. After operating circle on woodmill we have a great amount of leftover tree bark collecting in landfills. Its volume reaches millions of cubic meters, besides they require huge territories [1].

From a global perspective, decomposition of lumber leftovers is a very significant source of carbon dioxide (CO2) in the atmosphere. According to the Intergovernmental Panel on Climate Change the concentration of carbon dioxide in the atmosphere in the period since 1750 has increased by 31%. Its value was not as high as it is today, for the past 20 million years [2, 3]. It should also be noted that approximately one quarter of

anthropogenic CO2 emissions is a result of deforestation. In the present study we investigated the effect of temperature and mineral supplements on the rate of decomposition of different kind of bark.The following goals were set for the task:

1. Determination of CO2 emissions rate of the prepared sample;
2. Study of consistent pattern of decomposition of bark in different conditions.

Long model experiment on the decomposition of the bark of coniferous species (70% spruce and 30% pine) and aspen was launched in July 2015 on the basis of the laboratory of soil nitrogen and carbon cycles of the Institute of Physical-Chemical and Biological Problems in Soil Science, Russian Academy of Sciences in Pushchino. The bark was placed in a 500 ml vessels, for 6 months, it was incubated with temperatures 2, 12 and 22 ºC and humidity, corresponding to 70% of capillary fringe. The following variants of substrates were prepared: “pure” bark without additives (BS); a substrate made of bark and soil (SBS); SBS with the addition of N (urea) in an amount of 1% of dry weight of the bark (SBS-N); SBS with the addition of N (urea) and P (superphosphate) in an amount of 1% dry weight of the bark for each element (SBS-NP); soil (loamy gray forest) without the addition of bark. The CO2 concentration in vessels was measured with flow infrared gas analyzer LiCor-820 (USA) at least once a week. The rate of decomposition of the SBS expressed in mg $C/m^2 \cdot h$. To evaluate the intensity of the decomposition process of the PCB, we determined their respiratory activity (RA). RA expressed in mg C/g·h. To evaluate the effect of temperature on the rate of decomposition of the SBS (i.e. RA) using the temperature coefficient Q_{10}, which shows how many times the intensity of CO_2 emissionincreases as the temperature rises by 1°C.

The 6-month results of the experiment showed that the rate of decomposition of bark and SBS significantly depends on the incubation temperature and the presence of mineral additives.The SBS samples without the addition of nitrogen and phosphate

fertilizers CO2 emission occurred with less intensity. The highest rate of decomposition of SBS (182 mg C / m^2·h for the softwood, and 160 mg C / m^2·h for aspen) was observed during the first three weeks of the experiment at a temperature of 22°C and the simultaneous addition of N and P. At a temperature of 12°C at the maximum rate of decomposition was observed in the SBS based on aspen bark during the first week of incubation (43 mg C / m^2·h) and based on softwood - after seven weeks of measurements (97 mg C / m^2·h).

The maximum loss of the C-CO2 from substrates based on studied species of bark fall on SBS's variants with mineral additives at all temperatures (except variant of substrates based on coniferous bark at a temperature of 22°C).At a temperature of 2 ° C maximum carbon loss values reached 166 ± 15 mg C / g SBS (for softwood bark) and 229 ± 16 mg C / g SBS (for aspen bark). At a temperature of 12 ° C maximum carbon losses reached values of 185 ± 17 mg C / g SBS (for softwood bark) and 279 ± 16 mg C / g SBS (for aspen bark). At a temperature of 22 ° C, the maximum loss of CO2 from the SBS-NP based on aspen bark reach values of 300 ± 12 mg C / g SBS. It is noteworthy that at the temperature of 22°C in variants of BS based on the bark of conifers total loss of C-CO2 were higher than in other variants, and reached 188 ± 15 mg C / g SBS.

Pictures 1 and 2 show diagrams of temperature coefficient values in the ranges 2°C - 12°C and 12°C - 22°C for substrates based on studiedspecies of bark. Substrates based on softwood bark more sensitive to temperature change than on the basis of aspen. Thus, the temperature coefficient value of SBS and BSvariants in the temperature range from 12 to 22 ° C is equal to 2.1 and 2.2 respectively. Interestingly, in the variant with bark from soil by adding nitrogen and phosphorus increase the reaction rate in the range from 2°C to 12°C it was more than in the range from 12°C to 22°C. Influence of mineral additives weakened the influence of temperature.

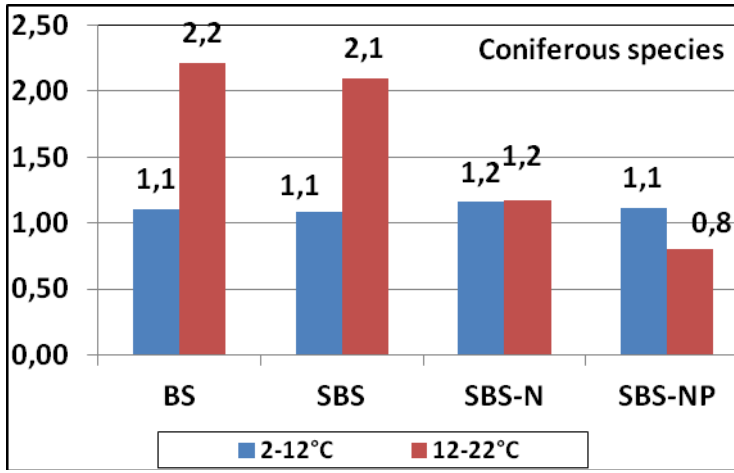

Figure 1. The temperature coefficients for substrates based on softwood bark

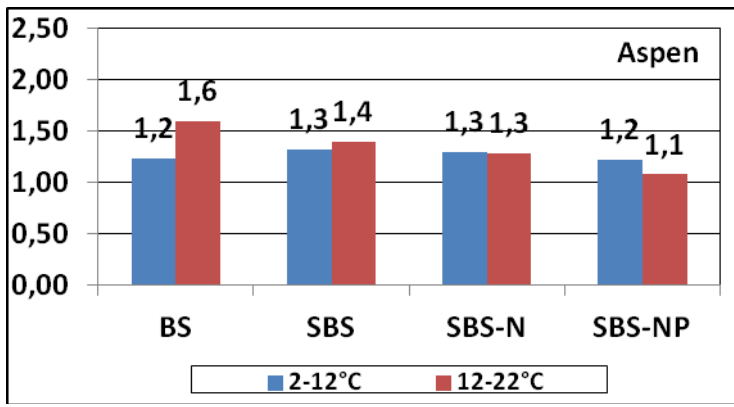

Figure 2. The temperature coefficients for substrates based on aspen bark

Thus, the emission rate of CO2 of substrates dependent on the incubation temperature to increase its gain RA substrates was observed. The presence of mineral additives also contributes to the strengthening of RA. Regarding tree species differences, the results of the study found thatsubstratesbased on aspen bark isolated CO2moreintensely than substrates based on softwood bark.Further, after 4-5 months of

incubation, bark mineralization speed was stabilized, indicating that there was easily decomposed biodegradation of all components in the SBS.Mineral supplements affect the dynamics of the rate of decomposition of aspen and softwood bark, and the overall losses of the C-CO2 for the time of incubation. The incubation temperature is not always exerted a marked influence on the rate of substrate degradation and total loss of C-CO2. The most sensitiveto the temperature increase SBS were based on softwood bark in the range from 12 to 22°C, for which the temperature coefficient Q10 was 2.1-2.2.

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Uvarov A.S. [1]*, Sobolev A.N.* [1]*, Klimachev D.A.* [2]

EFFECTS OF CHLORIDE SALINITY AND 'EPIN' TREATMENT ON THE GROWTH AND PHYSIOLOGICAL PROCESSES OF CORN PLANTS.

[1]*Master's students of the Department of System Ecology, Ecological Faculty, RUDN University, Moscow*

dallasmavs41@mail.ru

[2]*PhD., Assistant Professor, Department of Botany and Foundations of Agriculture, Moscow State Regional University*

docent18@yandex.ru

Abstract: Chloride salinity and its effect on the growth and development of corn plants are considered. The study has shown what is exposed to the impact of chloride salinity to a greater extent. One way to reduce the salinity is 'Epin'-processing plants.

Key words: degradation of soils, sodium chloride, Epin, corn plants, "210 Cuban Sugar"

Degradation of soils is one of the major problems today.

Because of salinity, soil properties and structure change losing its fertility. In our country, about 10% of the land surface is salted.

Intensification of secondary salinization of soils is caused by the irrational irrigation in most cases.

The aim of this work is to study the effect of sodium chloride (concentration of 0.5 g / l) and 'Epin' on growth and physiological processes of corn plants, "210 Cuban Sugar" breed.

The studies were conducted between May and September 2015, at the Department of Botany and Applied Biology of the Moscow State University. Plants were grown in hydroculture.

The following aspects of the test plants were studied during the experiment:

- Height;
- Length of the root system;
- Wet and dry weight

There were six replications of the experiment.

It should be noted that the greatest negative effect of sodium chloride on plant growth was noted in the first days of the experiment. Thus, on the second day, the height decreased by 67% relative to the control group, by 48% on the third day.

Treatment with 'Epin' expedited the growth of corn plants, a positive effect appeared in the middle of the experiment. At the end of the experiment, the effect was 25 %.

During the research it was identified that 'Epin' treatment reduces the negative effect of chloride salinity on the plants. At the end of the experiment, height of plants treated with 'Epin' was 116% (relative to the control group).

The influence of chloride salinity on the root system was considered. By the end of the experiment the root length was 85% relative to the control group. Root length of the plants treated with 'Epin' exceeded 16% root growth of the control plants.

The studies have shown the negative effect of chloride salinization on the wet weight of the aerial part of plants (weight of above-ground organs of test plants was 144%, and underground - 142%, relative to the control group). 'Epin' treatment also influenced the accumulation of fresh weight of the seedlings.

As for the dry mass, sodium chloride had greater influence on the underground part of plants. Dry weight of the root system was 79% compared to the control group; the weight of aboveground organs was 80%. Treatment with 'Epin' gave a positive result (dry weight of the aerial part of plants was 144 % compared to the control group, the underground part - 137%).

Conclusion

1. Chloride salinization negatively affects the functioning of the corn plants. It leads to the suppression of the growth processes;

2. Salinity has the greatest negative effect on the root system of plants;

3. Treatment with ‘Epin’ reduces the negative influence of salinity and contributes to the normalization of the growth processes and development of plants.

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Starinskaya R.A.[1], Starinskiy V.G.[2], Zhukova A.V.[3], Lashchenova T.G.[4]

LA EVALUACIÓN RADIOECOLÓGICA EN EL TERRITORIO DE LAS PLANTAS DE PRODUCCIÓN DE URANIO

Rusia

[1]*investigadora junior, la Institución Presupuestaria Federal el Centro Cientifico Estatal Federal Ruso "El Centro Federal Médico Biofísico de A. Burnazian" de la Agencia Fegeral Médico-Biológica (la IPF el CCEFR "El CFMB de A. Burnazyan" de la AFMB) de Rusia, Moscú,*

alifesty@gmail.com

[2]*ingeniero, la IPF el CCEFR "El CFMB de A. Burnazyan" de la AFMB de Rusia, Moscú*

vitalstar90@mail.ru;

[3]*estudiante de grado (4 curso) de la Facultad de Ecológía de la Universidad Rusa de la Amistad de los Pueblos (URAP), Moscú,*

zhuckova.nastena@yandex.ru

[4] *investigadora jefa, la IPF el CCEFR "CFMB de A. Burnazian" de la AFMB de Rusia, profesora de la Facultad de Ecológía de la URAP, Moscú, Doctora en Biología, Candidata a las ciencias en Química,*

tlaschenova@yandex.ru

Abstract. In order to meet the requirements of radiation safety in the rehabilitated area, it is now necessary to introduce a radiation monitoring system, the contents of which must be economically justified. In order to make technical decisions, that would provide the radiation monitoring, the state of the territory has to be assessed. This work aims to assess the radiological state of the one of the uranium legacy facilities, namely Lermontov production association "Almaz" (LPA "Almaz").

Resumen. Para garantizar la seguridad radiológica en las zonas rehabilitadas es necesario introducir un sistema de control de la radiación, cuyo impleo debe ser justificado económicamente. Para tomar decisiones técnicas con el objetivo de llevar el control de radiación, hay que evaluar el estado del territorio. El propósito de este trabajo es evaluar el estado radiológico de una zona de extracción de uranio llevada por La Unión de la Producción de Lérmontov "Almaz" (La UPL "Almaz").

Key words: activity of natural radionuclides, the dose rate of gamma radiation, external exposure, radiation survey of the territory, the natural sources of ionizing radiation, the average volume activity of radon, radiation dose, soil

Palabras claves: la actividad de radionucleidos naturales, la dosis de la radiación gamma, exposición exterior, control de la radiación del territorio, las fuentes naturales de radiación ionizante, la contaminación por radón, la dosis de radiación, el suelo

Introducción. El problema de la contaminación radioactiva causada por la extracción de uranio debe ser resuelto. Las áreas contaminadas por la radiación en los territorios donde se producía uranio son vastas (cientos de km^2) y se expanden debido a el escape de los radionucleidos al medioambiente.

En muchas zonas las medidas de la rehabilitación han sido realizadas totalmente o parcialmente. Para garantizar la seguridad radiológica en estas zonas ahora ha de ser usadas las tecnologías y sistemas de monitorización de la radiación caras, los cuales deben ser justificados económicamente. En primer lugar, para tomar decisiones técnicas, cuyo objetivo es llevar el control de radiación, es necesario evaluar el estado del territorio.

La evaluación del territorio de La Unión de la Producción de Lérmontov "Almaz" (La UPL "Almaz") ha sido realizada debido a que su restauración fue incluida en el programa federal “La Seguridad nuclear y radiológica en 2008 y para el período hasta el año 2015". En el territorio de La UPL “Almaz” hay minas desmanteladas número 1 y número 2, y el relave de la planta hidrometalúrgica. El trabajo aún está por acabar y es necesario llevar a cabo el control de la radiación.

El objetivo del presente artículo es la evaluación radioecológica de la situación en La UPL “Almaz”. El resultado debe recoger las recomendaciones sobre el volumen de control de la radiación.

Metodología. El objeto del estudio es el territorio de La UPL “Almaz” y la ciudad Lermontov adyacente a ella, suelos, las áreas de trabajo y de vida.

Las muestras para el contenido de los radionucleidos naturales (RNN) fueron investigados por el medio del método de gamma-espectrometría con el espectrómetro de los rayos gamma con el detector de semiconducción de la compañía “CANBERRA” b10188 con unidad de detección de BE5030 b10188. El método principal para determinar la media anual de la concentración de radón fue realizado con el equipo “TREK-REI-1M”.

Las pruebas de la dosis de la radiación gamma en aire libre en las áreas de trabajo y de vida fueron realizadas por el método del estudio gamma en pie o en automóviles.

Para la evaluación ecológica e higiénica de los resultados obtenidos fueron usadas las dosis permitidas de irradiación para personas y de fuentes naturales en las condiciones operativas (5 mSv por año), establecidas por la normativa de seguridad radiológica de 99/2009 (NRB-99/2009).

Resultados.

Fueron medidos los parámentros de la radiación de los objetos artificiales de La UPL "Almaz" y sus alrededores: la dosis de la radiación gamma en el área abierta y en zonas residenciales. En el perímetro de la planta de producción la dosis de la radiación gamma promedia no excedió el 0,12 μSv/h.

En la ladera de las explotaciones mineras abiertas la dosis de la radiación gamma alcanzó a 1,16 μSv/h y disminuyó al acercarse al límite de la protección física. Más allá de los límites de la protección física del relave los parámetros de la radiación no difirieron de los de la referencia. (0,12 μSv/h). En las áreas rehabilitadas la dosis de la radiación gamma no excedió el 0,20 μSv/h y el maximo era 0,40 μSv/h.

La intensidad del escape de radón de la mayor parte de la superficie de relave no supera los estándares y no difiere de la dosis referente.

En el área abierta de la ciudad la dosis de la radiación gamma osciló entre 0,09 y 0,28 μSv/h. Los valores de la dosis de la radiación gamma en la zona residencial eran similares (0,11-0,27 μSv/h). En esta zona los valores de la contaminacíon por radón no excedieron el 54 Bq/m^3 (200 Bq/m^3 permitidos).

La exhalación de radón de las explotaciones mineras abiertas contribuye a la formación de la dosis efectiva anual promedia para la población. Por lo tanto el cierre de las explotaciones mineras tienen prioridad en la rehabilitación. El cálculo muestra que la dosis efectiva anual promedia de la exposición externa de los ciudadanos es de 2,15 μSv. Estos datos caracterizan el ambiente de radiación como aceptable y son comparables con los valores regionales promedios de la región.

En los sacavones, en los relaves y en la cuidad Lermontov fueron tomadas muestras del suelo y fue evaluada la actividad de los radionucleidos naturales. La actividad de los radionucleidos naturales oscila:

- de 7,7 a 260 Bq/kg por ^{226}Ra;
- de 3,6 a 650 Bq/kg por ^{232}Th;
- de 130 a 1720 Bq/kg por ^{40}K.

Estos datos muestran que hay exsceso en los valores regionales promedios: para ^{226}Ra y ^{232}Th es hasta 10 veces, y para ^{40}K en 3 veces. En consecuencia, resulta imprescindible llevar el control del contenido de RNN, y por lo tanto, del contenido de ^{222}Rn.

Conclución. Basándose en el análisis de los sistemas existentes de observación, fueron elaboradas las recomendaciones para el desarrollo de sistemas de control ambiental en las plantas de producción de La UPL "Almaz" y sus alrededores.

Como el resultado del estudio fueron identificados los factores principales de exposición a la radiación de la población y del personal, fueron obtenidos los datos sobre las dosis y fueron formuladas las recomendaciones sobre las medidas de protección y de la reducción de las dosis de radiación.

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4. WATER RESOURCES AND ECOLOGY: MONITORING, POLLUTION AND RESTORATION

Chemurova E.V.[1]

ANALYSIS AND ASSESSMENT OF THE LIFE CYCLE OF PRODUCTION OF THERMAL INSULATION FROM MINERAL WOOL, FLAX AND EXPANDED POLYSTYRENE USING GABI 6 SOFTWARE

Russia
[1]*Master's student, Ecological Faculty*
bysinka.in.love@mail.ru

Abstract: Environmental problems have been gaining recognition recently. Nature and its resources are subject to irreparable damage that is directly related to the human factor. Humans do not take into consideration overall damage to the environment caused by increase of industrial development of previously wildlife areas. Considerable attention is paid to the protection of water resources. Natural waters are polluted in different ways, but the greatest threat to them is the activities of industrial enterprises. Dumping the wastewater of meat factory, containing large amounts of fat, affects surface fresh water.

Key words: wastewater, conditionally pure water, industrial wastewater, groundwater, pollution, PDS, sewage treatment plants, waste, sulfate, treatment.

Introduction. Currently, the problem of water pollution is the most relevant and everyone knows the expression "water is life". In the food industry special attention is paid to meat processing factories that are required to properly purify wastewater.

Consumed in the production process the water is polluted with organic substances of animal origin: fat, blood, and paunch content, and manure, pieces of animal tissue, hair, and bone fragments. In addition, the wastewater received salt, nitrates, detergents, sand, and clay in considerable amounts.

In the wastewater, impurities are mainly represented in the form of hard share suspensions, emulsions, colloidal and molecular solutions. Each type of contamination consists of organic and mineral parts.

The wastewater of industrial enterprises can be divided into the following groups:

1. Heavily contaminated, a concentrated effluent;
2. Slightly polluted, diluted with water;
3. Conditionally pure water;
4, Industrial wastewater that is subject to biochemical treatment;
5. Distillation residues, milk, etc.;
6. The reverse or re-used water;
7. Household water.

The analysis of the current approach to the treatment of wastewater from meat factory.

In the development of new technologies of wastewater, treatment of meat processing factories should take into account a number of factors, which depends largely on the continued efficacy of the methods used. We are talking about the following circumstances:

- The level of groundwater, which is necessary in order to exclude the possibility of accidental discharge of polluted effluents into the soil and mixing them with ground;
- Saturation of treatment facilities with all necessary engineering communications, and the availability of acquisition data structures
- The limited square footage of land allocated by the plan for the construction of sewage treatment plants.

The organization of rational process of wastewater treatment of meat factory.

Complex variable and heterogeneous composition of sewage of meat factory, strict requirements to the quality of their cleaning and the difficult economic conditions demand rational technological schemes. It is necessary in order to optimize the

treatment system to make it more modern and secure and also to minimize the danger of wastewater.

One of the rational decisions is a diagram of wastewater treatment of meat processing enterprises, which involves the decontamination of protein-fat mass. Wastewater from these impurities should be given maximum attention. The considered technological scheme was developed after lengthy and detailed analysis and monitoring of all the disadvantages of the schemes used previously. The most important element of this scheme is that it includes such a process as processing of the protein-lipid mass into a useful product.

Typical projects of sewage treatment plants are not always justified, since it is known that a well-functioning sewage treatment at meat processing plants will be bulky and uneconomical for small firms and inefficient for large ones.

The actual problem is the choice of such scheme of wastewater treatment enterprises, which at minimal cost to provide the necessary degree of purification. To accomplish this, we created a database, which includes information about the performance of each type of equipment are in indicator of the quality of wastewater treatment, as well as information on limitations and feasibility of its application in the selected operating conditions.

One of the approaches in the rational scheme of wastewater treatment is to develop a mathematical model that characterizes the efficiency of sewage treatment plants with minimum costs and meeting regulatory requirements for purified water.

To do this, enter the number of restrictions required for the construction of a rational technological scheme of sewage purification: firstly, the number of treatment facilities and, therefore, the value of operating costs; secondly on the allowable contents of all types of contaminants in wastewater before and after treatment; in the third – for the discharge of wastewater and fourth in size and cost of the considered equipment.

Using a computer, you can choose a rational scheme of wastewater treatment in the presence of data about each piece of equipment. It is necessary to obtain the possibility of forming a variety of purification schemes with a different location in the respective equipment.

Methodology. The release of waste water from sewage treatment plants into the river through the outlet works located near the shore. That is why the calculation of the PDS is given a lot of attention. Initially we calculated frequency of dilution (for summer and winter period there are different formulas). Dilution ratio n is determined by the method of V. A. Frolov and I. D. Rodziller.

This is followed by the determination of the concentration that is allowed to be reset, which is performed after the calculation of PDS. These calculations are necessary in order to establish concentrations of suspended solids, sulfates and oil products in river water. Then we found out whether they have an increased value.

Results of Calculations

In this research I have evaluated the environmental hazard of sewage meat processing industry and described the main types of component composition. I also analyzed modern and rational methods of wastewater treatment and calculated the PDS, which directly affect the condition of water bodies.

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Egorov M. D.

ENVIRONMENTAL MONITORING OF THE RIVERS OF MOSCOW AND MOSCOW REGION

Russia
Bachelor's student, Ecological Faculty
RUDN University, Moscow
cool.ferdinant@yandex.ru

Abstract: Currently there is a global problem of pollution along the rivers of Moscow and Moscow region that need to be address as quickly as possible.

Keywords: Monitoring, device called “Teodolit”, GPS, 3D-modeling, anthropogenic impact, pollution of rivers, landfill, Sounder.

Working in “Mosekomonitoring” organization is an extremely interesting experience. Every year a group of scholars and students from RUDN university go to the riverside of the Moscow river and monitor it. They need to describe the pollution and anthropogenic impact [1].

Each person has empty printed forms, which need to be filled and GPS navigation. The Navigator shows the GPS points, which are stored in the device memory.

The scientific observation of the riverside consisted of several steps. The first step, when they come in to the appointed place, was to take a picture. Then it was easier to track down the location where the photos took, when processing data. Up next, each of four people, have their own task.

The essence of work was to describe the five most unfavourable plants, such as “Acer negundo”, “Heracleum sosnowskyi”, “Fallopia sachalinensis”. For example, in Moscow, on the rivers one can often observe huge areas of “Acer negundo”.

Each person had their own form, in which they had to fill in the exact date and time of his or her observations. Every day, they also had to walk the entire river from the river estuary to the manifold river.

During the route, there were bigger areas of garbage dump, unorganized recreation centers, waste, spilled into rivers, illegal logging and waterlogging rivers. In some places, water had a very unpleasant smell, and often one could see water stains from chemical wastes. A large number of houses and plots built along the riverside or not well-groomed territory along the banks of the river were observed.

Erosion processes in Moscow which are not distributed yet, are not so serious, as for example, in suburban areas. Moreover, a great number of drains along the rivers greatly affect the condition of the water. Many bridges are just in a terrible state and some of them are gradually destroying or sometimes are even collapsing.

There have been cases when territory, which is monitored every year, is closed from unwanted guests. Sometimes environmentalists cannot describe most of polluted areas, due to obstruction of trees. Moreover, many "Poligons" have the mowed grass, and a person is unable to identify plant species.

When the areas under study were described, three types of forms were used. "First form" includes lower, middle and upper tiers of the flora. The "second form" describe plants in the middle of the field rather than in the woods as the previous one. And the "third form" deals with harmful plants of the zone. Moreover, it was also necessary to draw a diagram and specify the dimensions of the area.

For a description of the rivers, only one form was taken. It is worth noting that the letterheads was represented by two parts: the first part is the height of the banks, than the width of the river channel, its depth and what is in the bottom. Then the second part describes directly the coast: whether erosion processes are developed or not and to what extent. The most important thing is to specify the GPS point on the form. Also, it is necessary to write comments on each sheet, already in a more expanded form, as territory.

There is also another group of specialists - hydrologists. Their objective is to explore the same rivers, and sometimes the others, but with the device, called "Teodolite". One of them includes a measuring scale on certain points, and helps to determine the excess on the slope [2]. Apart from this, they have defined as the water level goes up or down in comparison with the previous time this year. In addition, they brought the boat into the water and floated downstream directly to the collector. The main task was to draw the bottom topography of the river, using the device "Sounder". The device must be fixed on the stern of the boat and lowered into the water. It receives ultrasonic signals from the bottom surface and all living and non-living creatures or objects in the river or on bottom of it. The appliance gets all these data, showing the trajectory of movement and depth [3]. Professionals should move in the direction from shore to shore, using a special method called “zig-zag”, but this must be only in specific areas [4].

When all these data are collected together, they can see the full picture of what is happening on the bottom of the river – a 3D-model [5].

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Peguita Ernest Sese

VULNERABILITY OF WATER RESOURCES AND COASTAL TERRITORIES TO CLIMATE CHANGE (GUINEA)

Guinea
Master’s student, Ecological Faculty
RUDN University, Moscow
peercelina90@gmail.com

Key Words: Natural Regions, Natural Reserves, Climate Change, Biodiversity, Water tower, Vulnerability, National Action Plan for Climate Change Adaptation artisanal fishing, rice growing lands.

Introduction**.** Coastal countries of West Africa. Guinea is located between 7 ° 05' and 12 ° 51' N, 7 ° 30 'and 15 ° 10 west

longitude. It covers an area of 245,857 km² half way between the equator and the tropics.

Guinea has four natural regions. These natural regions have the advantage of very different climatic, hydrological and ecological characteristics. The country is very known for its rich biodiversity, with endemic species (In Mount Nimba Strict Nature Reserve).

This country, like others on the planet, is also a victim of climate change, against which it presents high level of vulnerability.

The studies of vulnerability and adaptation to climate change conducted in Guinea indicate that the downward trend in rainfall and temperature rise observed since 1961, population growth and extreme poverty make various resources and socio-economic groups very vulnerable to climate change.

The vulnerability of water resources. Guinea has over 1150 watercourses divided into 23 river basins including 14 transboundary watercourses which have their source in Guinea. What makes rightly Guinea the water tower of West Africa.

Numerous studies in Guinea as part of the national action plan for adapting to climate change indicate a significant effect of climate change on water courses in Guinea.

Thus, it was shown that phenomena exacerbated by climate change as drought, during the period between 1961 and 1990 pulled down the hydrological regime of rivers. This decline is also confirmed by reading the variation of hydraulicity and rainfall curves, especially over the last decade.

According to data on the projection of the change in flow of some rivers, there should be in the following years a rate reduction exceeding 50% of the average as in 2013. A phenomenon that will be generalized to all the country, and even very accentuated in the north of the 10th parallel.

Still according to this projection, rivers such as Niger will reduce their speed in years from 2050 to 2100 from 16 to 28% in sensitivity 2.5 ° C and from 23 to 54% in sensitivity 4.5 ° C.

Also, the major rivers of the Niger Basin suffer nowadays from phenomena related firstly to the loss of vegetation cover and soil moisture and secondly to increased water erosion by rainwater and destruction of gallery forests.

Table 1: Projected change (%) of speed of some rivers

Dates	2000	2025	2050	2075	2100
Rivers and station	sensitivity 1,5°C				
Niger; Kouroussa	-1,49	-5,32	-11,79	-20,18	-29,91
Konkouré; Pt Télémélé	-1,51	-5,35	-11,77	-20,17	-29,89
Rivers and station	sensitivity 2,5°C				
Niger; Kouroussa	-2,40	-7,86	-16,83	-28,28	-41,13
Konkouré; Pt Télémélé	-2,40	-7,86	-16,79	-28,27	-41,12
Rivers and station	sensitivity 4,5°C				
Niger; Kouroussa	-2,78	-10,79	-23,01	-38,26	-54,17
Konkouré; Pt Télémélé	-2,80	-10,76	-23,00	-38,25	-54,18

The vulnerability of the coastal zone. Guinea's coastal zone includes waterfront plains and low-lying estuaries (4 to 5 meters), which are either flooded by the tide or by the river overflows. Because of its climate, vegetation, natural resources and its strategic geographical position, this area has become a magnet for a constantly increasing population.

The main socio-economic activities are agriculture, fishing, fish smoking, salt production, forestry and animal husbandry. These activities occur throughout the area but the predominance of one activity over another varies from one area to another depending on the availability of resources.

Moreover, following the decline of the food base and the drying up of rivers, the quantitative and qualitative decline in fish production will follow the pace of climate change which present

the huge risk of malnutrition, when we know that artisanal fishing provides the population close to 80% of its protein needs.

Added to this is a drastic reduction in cultivable land rice by 2100 of 37% sensitivity 2.5 ° C and 60% sensitivity 4.5 ° C as reported in Table 2.

Table 2: Estimated losses of agricultural land from 2050 to 2100 different sensitivities

sensitivity	Current Area (ha)	Loss of land in ha			
		(%)	2050 horizon	(%)	2100 Horizon
2.5°C	78 000	17	13 260	37	28 860
4.5°C	78 000	30	23 400	60	46 800

In conclusion**.** Climate change will cause great disruption among which can be listed, the decline in rainfall, recurrent droughts since the 1970s, early and frequent floods (Kankan 2001, Boke - 2003 Gaoual- 2005, etc.) disruptions in rainfall patterns and that of the decline of the rivers speed. Which will cause the drying up of rivers, drainage of soils, destruction of vegetation, the decline in agricultural production, the increase in water-borne diseases, especially in the part north, and increased risks of malnutrition and starvation related to the reduction of rice growing lands.

Agricultural soils and rice are the most vulnerable resources. Small ruminants, poultry and vegetable crops are less exposed to climate risks. The most vulnerable socio-economic groups to climate risks in the country, are farmers and growers, since they depend entirely on natural resources.

The main environmental constraints in Guinea are inappropriate agricultural practices, abuse and unregulated exploitation of forest and wildlife resources, open pit mining, bush fires, extreme poverty (53% of the population), poor

management of household and industrial waste, variability and climate change.

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Ivankin D.A.

MODERN ADVANCED TECHNOLOGIES FOR DRINKING WATER AND WASTEWATER DISINFECTION

Russia
Bachelor's Student, Ecological Faculty
iiivankin@mail.ru
RUDN University, Moscow

Abstract: The development of alternative environmentally friendly methods of wastewater disinfection with trace pollutant resistant to biodegradation superior performance present industrial methods is a major problem. This article deals with the modern disinfection agents, including anolyte, ferrates.

Key words: disinfection, wastewater, drinking water, chloration, ultraviolet, anode liquor, anolyte, ferrate technology.

Introduction

The main drinking water factors of quality are the safety in the epidemiologic situation, harmless chemical composition and favorable organoleptic properties. At present, these factors are generally accepted around the world. There are regulatory instruments in the field of drinking water quality in the different countries based on factor of quality. According to the RF standards requirements, residual chlorine concentration in the water before entering to the water-supply system is in the range of 0.3-0.5 mg/l. Therefore, usage of chlorine-containing agents is the main disinfection technology for natural water and wastewater.

Methodology

Although there are some disadvantages, the usage of chlorine-containing reagents allow providing a disinfection agents sustained action. However, the chloration usage may lead to chlorine environmental contamination, toxic products formation and even more than the primary impurity.

Water chloration alternative is disinfection with ozone. Ozone is one of the highest oxidation agent, but it is destroyed quickly and its bactericidal action is impermanent. Ozone also react with phenols in the water, and, as a result, high toxic components are formatted, so it cannot be used for wastewater treatment, discharging after into water reservoir.

There are some physical disinfection methods for drinking water. The most widely water disinfection is ultraviolet. Nevertheless, UV water disinfection treatment produce a local effect, but it has not sustained action. Therefore, it is used along with chlorinated substances reducing the chlorine treated water level in the present conditions.

Biological wastewater treatment is the most cost effective and environmentally friendly to remove macrocontarminations

(biodegradable organic compounds, nitrogen compounds, phosphorus, sulfur, etc.). However, these methods are often not so effective to groundwater contamination, for example, intensive agriculture, household cleaning products, pharmaceuticals.

The most perspective chlorinated reagent is an anolyte. It is active substances mixture: gaseous chlorine, chlorine dioxide, singlet oxygen, intended for water disinfection. It belong to a minimum (IV) toxicity class. It is metastable. It does not environment accumulation. When there is at least 30 days, anolyte is deterioration itself to fresh water (salinity is less than 1 g/l). There is no any decontamination and disposal, so anolyte is environmentally friendly and does not harm the environment. Anolyte is effective against all pathogens, including bacteria, viruses, mycobacteria, anaerobic infections causative agents, dangerous infections causative agents, fungi and spores. Anolyte diluted form is used to municipal water supply systems for water disinfection in reservoir, for combating microflora in industrial water circulation systems. Concentrated form anolyte is for sterilization medical instruments, skin and wounds.

Ferrates (VI) alkali metal possessing multifunctional properties are modern and promising reagents for water purification without chlorine. Ferrates (VI) are the greatest oxidant and they are able to degrade toxic chemicals to low toxic products (oxidizing effect) and cause the microorganisms' death (disinfecting effect). Decomposition products of ferrate solution is iron hydroxide (low-toxic product). Dry stabilized ferrate production requires high expenditures on its synthesis, transportation and packaging.

Ferrates technology is used for effluent treatment or for water disinfection in combination with chlorinated reagents. It is allow reducing the chlorine treated water level or abandon primary chlorination.

Discussion

After technologies characteristics researching it is necessary to compare the main specification of all disinfection agents.

Table 1. Advantages and disadvantages comparative analysis of water disinfection agents

Disinfection agents	Efficiency	Safety	Cost effectiveness	Usability	Consequences	Low concentration byproducts
Gaseous chlorine	+	-	+	-	+	-
Sodium hypochlorite	+	+	-	-	+	-
Calcium hypochlorite	+	+	-	-	+	-
Chlorine dioxide	+	-	-	-	-	+
Trioxygen	+	+	-	-	-	+
Ultraviolet	+	+	-	+	-	+
Anolyte	+	+	+	+	+	+
Ferrates (IV)	+	+	+	+	-	+

Conclusion

To summarize, the most promising agent for water purification in the municipal wastewater treatment is anolyte, which has a prolonged action (chlorine solution in water). It obtains by saturated solution electrolysis of sodium chloride in water, but for industrial wastewater treatment promising product is sodium ferrate (Na2FeO4). This material produces by electrochemical dissolution of iron anode in a NaOH solution, which, in turn, is produced in a membrane cell as a byproduct during the anolyte generation electrolysis in-place.

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Kamagate S.A.[1], Makarova M.G.[2]

ÉVALUATION DE LA VULNÉRABILITÉ ENVIRONNEMENTALE DU LITORAL DE LA COTE DE L' COTE D'IVOIRE EN CAS DE POLLUTION PAR HYDROCARBURES

Côte d'Ivoire, Russia
[1]Postgraduate student of the department of Geo-ecology
[2]Assistant professor of the department of Geo-ecology
Ecological faculty
RUDN University, Moscow
[1]sindou1985@yahoo.fr, [2]mgmakarova@yandex.ru

Résumé: La production de pétrole en Côte d'Ivoire est la branche de l'industrie minière la plus développée. Afin d'assurer la protection de l'environnement de production pétrolière et de son transport, cet article évalue la vulnérabilité totale de la zone côtière de la Côte d'Ivoire en cas de pollution par hydrocarbures

Mots-clés: Côte d'Ivoire, extraction de pétrole, la vulnérabilité côtière, pollution par hydrocarbures, l'indice de sensibilité environnementale.

Introduction**.** La production de pétrole dans le pays est le secteur le plus développé de l'industrie minière. La découverte en 1977 de "Belier", réserves de pétrole dans la région de Grand-Bassam, et du champ pétrolier "Espoir" en 1979 ont été suivi par les recherches du gaz naturel, estimées à 50-70 milliards m^3. À ce jour, il y a plus de 200 puits, huit champs pétroliers dont quatre actuellement en production. Le "Code pétrolier" de 1970 devenu la loi N70-489 est la principale législation qui définit les activités de l'industrie pétrolière, le décret 70-528 du 2 Septembre 1970 réglementant l'application détaillée de cette Loi [2].

Résultats et discussion. C'est la compagnie pétrolière nationale "PETROCI" créée en 1975 qui est l'outil pour la mise en œuvre de la politique pétrolière nationale. L'une des activités importantes de la société est d'évaluer les possibilités et les moyens des sociétés opérationnelles pour la lutte contre la pollution par hydrocarbures.

Nous avons juxtaposé tous les paramètres pour obtenir la carte synthèse de la vulnérabilité globale du littoral ivoirien par rapport à une pollution d'hydrocarbures (Fig. 1).

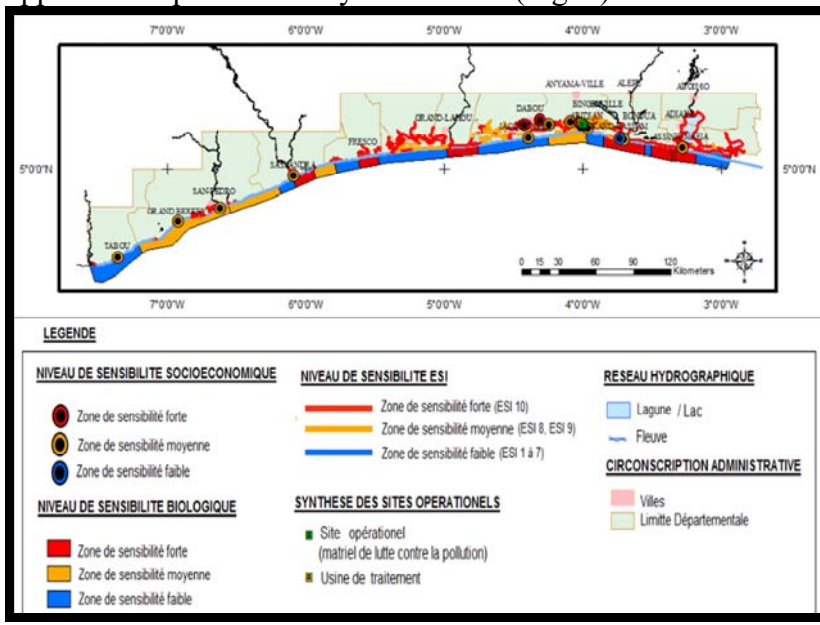

Fig. 1. Carte de vulnérabilité globale du littoral ivoirien

1. Les thèmes qui composent les cartes de vulnérabilité sont: Vulnérabilité générale de la cote d'après l'indice ESI ; Ressources biologiques vulnérables ; Activités socio-économiques et usages vulnérables ; Ressources logistiques et opérationnelles ; Sources de pollutions.

2. Indice de sensibilité environnementale (ESI) est utilisé pour identifier la vulnérabilité du littoral avant un déversement d'hydrocarbures afin de définir les priorités en matière de protection et des stratégies d'assainissement des cotes. La vulnérabilité du type de côte est synthétisée en 3 classes par l'indice ESI: S1 (faible: ESI 1 à ESI 7); S2 (moyenne: ESI 8, ESI 9) ; S3 (forte: ESI 10).

3. Les ressources biologiques sensibles ont aussi été synthétisées en 3 classes selon la valeur. Ainsi nous avons a) aires

protégées: parcs nationaux, réserves, zones humides (RAMSAR), b) forêts classées, c) autres zones.

4. Les activités sont synthétisés en 3 classes selon leur importance économiques: a) forte : pêche de subsistance, prise d'eau / aquaculture, village de pêche, forêt sacrée (si non classée en ressources biologiques) ; b) moyenne : zone de pêche commerciale, zones touristiques, principales industries portuaires ; c) faible : site culturel, site archéologique, etc.

5. Les ressources logistiques et opérationnelles permettent de répondre face à une pollution.

Conclusion**.** Suite à la crise politique de 2010-2011 et les hostilités ultérieures, tous les moyens à la disposition du centre ivoirien antipollution (CIAPOL) ont été détruits. Selon les estimations de 2013 [1], dans le cas d'un déversement de pétrole, les dommages environnementaux seront inévitables.

La vulnérabilité globale et l'élaboration de la carte a été réalisée sur la base de la somme des indicateurs communs avec attribution de priorité, le degré de charge anthropique.

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Konovalova E.E.

CONTAMINATION EVALUATION OF BOTTOM SEDIMENTS OF SMALL RIVERS IN THE MOSCOW REGION

Russia
Post-graduate student, Ecological Faculty
RUDN University, Moscow
konelen90@mail.ru

Abstract: The article presents the results of studies of bottom sediments of Pakhra and Pekhorka, two small rivers in the Moscow region. The concentration of heavy metals was determined by atomic absorption method in water samples, by x-ray fluorescence in samples of bottom sediments showed to be a secondary source of water pollution.

Key words: bottom sediments, heavy metals, river, bottom accumulation coefficient, water pollution

Introduction**.** River bottom sediments play an important role in the formation of aquatic ecosystems and determine their features. They serve as a reliable indicator of anthropogenic contamination, allow determining the scale and evaluating the intensity of anthropogenic impacts on rivers [5]. Wastewater discharge leads to the accumulation of various pollutants in sediments [2; 3; 6]. This is due to the specific composition of the wastewater which contains high concentrations of many chemical elements. [1: 39]. This article presents the results of evaluation of the contamination of the bottom sediments in two small rivers of the Moscow region using the bottom accumulation coefficient (BAC).

Pakhra River is a right tributary of the Moscow River, Podolsk and other towns are situated on banks of this river. It has serious anthropogenic impact.

Pekhorka River is a left tributary of the Moscow River, Balashikha town, other large settlements with industrial zones are located near the river. The main polluting units are the Lyubertsy treatment facilities, industrial plants dumping of solid waste.

Methodology**.** Sampling points were selected near the road bridge and towns. The concentration of heavy metals in water

samples was determined by atomic absorption method, in samples of bottom sediments was determined by x-ray fluorescence. Calculation the bottom accumulation coefficient (BAC) for the selected elements was made according to the formula:

$BAC = C_{bs} / C_{water}$,

C_{bs} is the concentration of heavy metals in bottom sediments, mg/kg; C_{water} is the concentration of heavy metals in water, simultaneously selected in the same sampling point, mg/l. [4]

Results**.** Selected sediment samples were analyzed for heavy metal content. The analysis revealed that the main pollutants are lead, zinc, copper and nickel.

The results of calculation of the bottom accumulation coefficient (BAC) are shown in Table 1.

Table 1. BAC of Pb, Zn, Cu and Ni in rivers

Heavy metal	r. Pakhra	r. Pekhorka
Pb	$3,8*10^3$	$10*10^3$
Zn	$3,1*10^3$	$5,3*10^3$
Cu	$1,9*10^3$	$7,3*10^3$
Ni	$0,5*10^3$	$1,2*10^3$

According to the classification of the bottom accumulation coefficient (BAC) in [4], we can conclude that the level of heavy metals contamination of rivers sediments is high. It is a result of the chronic pollution of both rivers.

Conclusion**.** Bottom sediments accumulate pollutants and can become secondary sources of water pollution and have a negative impact on living organisms. [2, p. 78] Further studies are required to determine the pollution extent of small rivers and assess their impact on the river Moscow.

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Lesechko O.V.

ECOLOGICAL ASPECTS OF DESIGNING AND FUNCTIONING OF A DRAINAGE SYSTEM IN THE BRIDGE CROSSINGS (THE CASE STUDY OF THE TRUBEZH RIVER, YAROSLAVL REGION)

Master's student of the Department of Environmental Monitoring and Forecasting, Ecological Faculty, RUDN University, Moscow
lovestory.93@mail.ru

Abstract: This article is devoted to the main method of water treatment system selection for a bridge crossing, the case study of the river Trubezh situated in the Pereslavl-Zalessky district of the Yaroslavl region. The study contains the main methods of the surface runoff purification, as well as calculations on selection of a water treatment system for the Trubezh river.

Keywords: wastewater treatment, water treatment systems, water treatment system selection, river Trubezh.

Is it worth mentioning that water is the main source of life. Human body consists of water for more than 70%. Placed in the ideal conditions, a human being will survive for no longer than five days without water. Water is a source of many micro- and macronutrients, making the quality of water extremely important. An aquatic environment pollution not only affects humans, but also all the rest of the environment. World ocean pollution is one of the global environmental problems of mankind. One of the causes of the world ocean pollution is improper or even absent water treatment systems at the highway drains, what is «clogging» an aquatic environment with oil products and suspended particles (which are the main highway pollutants of an aquatic environment).

The purpose of this study includes the analysis of composition and conditions of the surface wastewater treatment of a bridge transfer over the Trubezh river and the choice of the most effective method of the surface runoff purification.

As it was stated above, the main sources of water pollution from a highway are the petroleum products (or hydrocarbons) and suspended particles (soot). Diagrams, presented on figures 1 and 2 show the composition of exhaust gases. Although it can be seen from the diagrams that the hydrocarbons and soot constitute a small part of exhaust gases, but having the capacity of more than 14000 vehicles per day (the "Kholmogory" trunk road where the Trubezh river bridge is situated), overall negative impact of these impurities multiply increases [5]. The suspended particles from exhaust gases that get into a storm drain have different fraction and chemical composition. It is shown by table 1 and 2 [3].

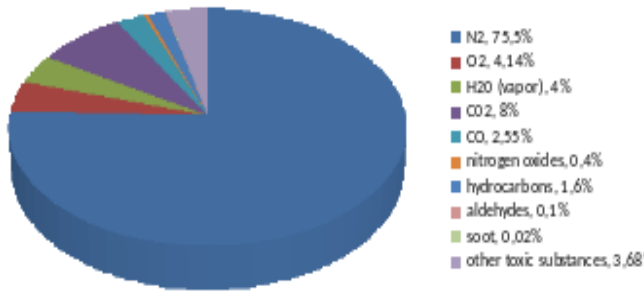


Figure 1. Composition of gasoline engine exhaust gases.

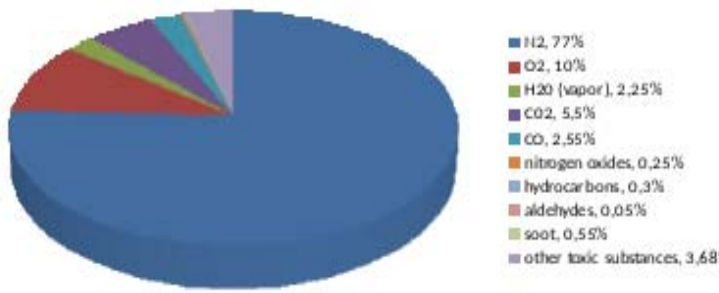


Figure 2. Composition of diesel engine exhaust gases.

Table 1. Fraction composition of suspended particles.

Fractions	Per cent content
0 to 2 μm	54,3
2 to 5 μm	22
5 to 7 μm	8,9
7 to 10 μm	7,8
Over 10 μm	7

Table 2. Chemical composition of suspended particles.

Substance	Content in the estimate, %
Silicon oxides	76,4
Iron oxides	3,1
Aluminum oxides	6,0
Calcium oxides	2,9
Magnesium oxides	1,6
Water and other substances	10

Table 3. Average indicators of composition of impurities in a surface rain runoff.

Indicator	Content in drainage water
Suspended particles, mg/l	21…6300
A solid residual, mg/l	62…7800
pH	2,9…8,9
Total hardness, mg-equ/l	2,2…50,7
BOD_{30}, mg/l	19…29
COD of the settled water, mg/l	8…118
Total phosphorous, mg/l	0,01-0,5
Chlorides, mg/l	2,0…239
Sulfates	18…3079
Petroleum products, mg/l	0,1…6,0
Phenols	-

As it can be seen from the tables, suspended particles mostly consist of silicon oxide and microfine powders. The petroleum products of various structure and composition are also present in the surface runoff, as they are formed during the incomplete fuel combustion (Table 3) [7].

There are three main groups of methods for the wastewater purification: the mechanical methods, which are aimed to remove suspended solids and finest particles from the water; physicochemical methods, aimed to remove the dissolved impurities; biological methods aimed to remove the contaminants with the help of biological plants and microorganisms [4, 8].

The major characteristics of a facility explored (in our case, it is the Trubezh river and specifically the bridge crossing itself) and climate-geographical characteristics of a territory influence the choice of a water treatment technology. The length of the Trubezh river makes up 36 km, average width is 25 m, depth - 3 m. [1]. The river flow is slow and sums up to an average of 0,4 m/s. Nourishment of river is presented on a diagram (Figure 3), and monthly distribution - on Figure 4 [1].

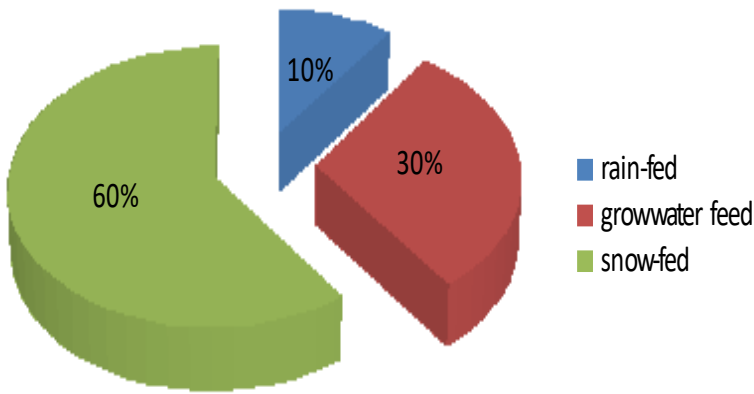


Figure 3. The river Trubezh fed

Projected bridge is a medium-sized bridge crossing. The bridge is situated at a highway assigned to category IB, which is a fast road with the capacity of over 14000 vehicles per day. The width of a roadway is 11,5 m. The width of the pavement (for service purposes) - 1 m. The road surface of a bridge crossing is a multilayer construction situated inside the borders of a roadway

that takes the pressure from the vehicles and transfers it to the ground [7].

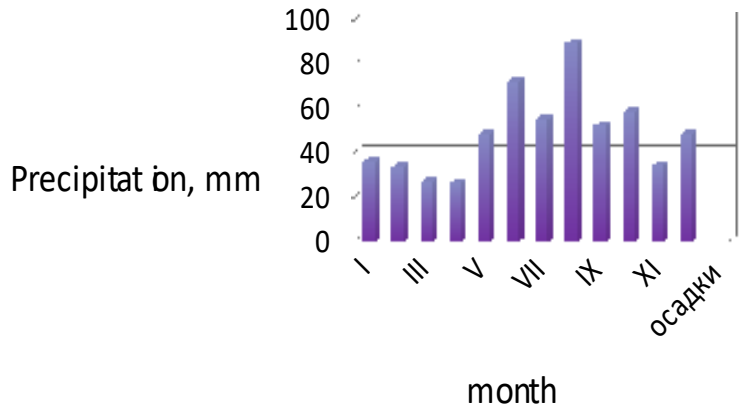


Figure 4. Monthly precipitation distribution in the Yaroslavl region

It is necessary to know the allowable discharge rate (ADR) to select the water treatment technology. For its calculation the "Methodology of the allowable agent and microorganism discharges development for water consumers" of 17.12.2007 №333 was applied. All the necessary formulae for a calculation are listed in table 4, the data used for a calculation - in table 5 [6].

Table 4. Formulae of ADR calculation.

A formula	Values
ADR calculation: $ADR=q*C_{ADR}$	q - maximum hourly flow rate of the water, C ADR - allowable concentration of the pollutant.
2. Calculation of C_{ADR} fot petroleum products: $C_{ADR}=n(C_{TLV}-C_b)+C_b$	TLV - threshold limit value of a pollutant in the watercourse, g/m³; $_b$ - background concentration of pollutant in the watercourse, g/m³: n - order of total dilution of drain waters in the watercourse.

3. A calculation of $_{TLV}$ for suspended particles: $m=p(\gamma*Q/q+1)+b$	m is taken as $_{TLV}$, γ is the mixing coefficient; b - the content of suspended particles in the water before it was mixed with the drain, g/m³; p - the increase in suspended particles content in the water allowed by the sanitary conditions after the drain was mixed in, g/m³ ; Q, q - flow rates respectively of river and drain waters, in a m³ per day.
4. A calculation of the mixing coefficient: $\gamma=2,5*\sqrt{n_r}-0,13-0,75*\sqrt{R}*(\sqrt{n_r}-0,1)$	R - hydraulic radius of the stream, which is approximately equal to the average river depth, *m*; n_r - roughness coefficient of a river channel, determined according to the reference data (a table of M.F. Sribnyj).
5. Wastewater consumption calculation: $Q=q_s*F*k$	q_s - the specific rainwater flow rate, l/s on 1 ha, F - the area of the part of the highway (or a bridge), ha; k - coefficient, that is taking into consideration the specific flow rate of water depending on an average longitudinal slope of a road or bridge area

In addition, the water purification system selection was made in accordance with the best available technology criteria. They include:

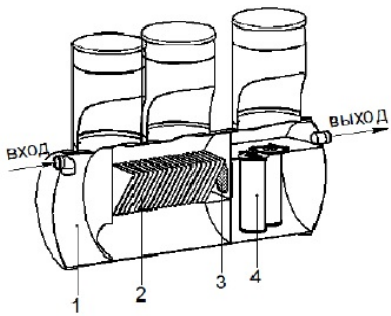
4. integrated technology impact on the environment;
5. economic feasibility of technology implementation taking into account capital expenditure and service costs;
6. applied technology must be tested at an industrial level;
7. local environment;
8. geographical location of the polluted object.

Table 5.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_{III}	0,04
Mixing ratio , γ	0,24
Permitted by the sanitary rules increase in suspended solids in the water body after water discharge , p, g/m3	0,75
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 llowable discharge calculation are italicized in the Table. They were used as basic criteria for treatment plant selection.

A broad spectrum of water treatment systems is represented at the modern market. Summing up all the demands of the conducted research complex water treatment system "Veksa-2M" (currently represented at the Russian market) was selected. It includes: a sand trap, a thin layer sump, a coalescer separator, a two-step sorption filter. This plant allows to purify the surface runoff to the TLV level that fully meets the best available technology criteria and does not exceed the ADR (Figure 6) [2].



1. A sand trap;
2. A thin layer sump;
3. Coalescer separator;
4. A two-step sorption filter.

Figure 5. Process scheme of the "Veksa-2M" water purification system.

Based on the conducted research following conclusions were made:

1. The processed petroleum products and suspended substances, which mostly consist of the particles up to 2 μm of extent (the most dangerous), are the priority pollutants of an aquatic environment from a highway.

2. The bridge over the river Trubezh, 69.28m long, can be classified as medium-sized bridge crossing, at the same time, a highway where the bridge is situated corresponds to category IB.

3. Basing on the calculation made, it was determined that, taking into consideration the environmental conditions of an area, its location and background concentrations, the amount of substances, allowed to be emitted adds up to 0,054 g/h of the petroleum products, 102 g/h of the suspended particles, which corresponds to gross relief of 0,0005 and 0,89 t/y respectively.

4. It was determined that to follow the suspended particles and petroleum products allowable discharge rates it is advisable

to use the "Veksa-2M" treatment system, which provides the TLV-level purification of bridge crossing surface run-off.

5. It is shown that this water treatment system corresponds to the principal criteria of the best available technologies and during its exploitation no additional biological purification is needed.

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Skavinskaya N.Yu.

DRINKING WATER AS A NATURAL RESOURCE

Bachelor's student, Ecological faculty
RUDN University, Moscow
Naduxao603@mail.ru

Abstract: The article describes importance of water for a human body and its function. Also the pollution reasons, methods of cleaning and projects related to potable water are considered.

Key words: drinking water, "water hunger", underground sources, the turnpike, agricultural fertilizers, drains, boiling.

Water is certainly one of the main natural resources on the Earth. And not only on the Earth. We know about existence of water in solidity on the Moon, and if to trust the latest news, this natural element was found on Mars too. And if so many people are anxious searching for water not only on our planet, but also on others, no doubt, the importance of potable water is worth being spoken about.

We drink water every day. But how often do we think about condition of potable water, about its sources, how much water remained on the planet? At the moment inhabitants of the Earth

really suffer from shortage of potable water. Its sources are distributed extremely nonuniformly. In some countries water is infected [2].

Where is potable water taken from? Sources of drinking water can be divided into 2 groups – the surface and underground ones. Surface water is water of the rivers, lakes and glaciers. One should remember our unique source of pure water – the Baikal [4].

Underground sources are spring and artesian water. We know that some springs are unique natural objects, and water possesses curative properties because reaches us in its original state and is exposed to natural cleaning. Spring water is sold to us in bottles too. Those springs from which this water is taken must be situated quite far from city dumps and other polluting communications. Also this water must be checked constantly by public health services, and on a label of a bottle precise location of a spring must be specified [4].

The artesian water, unlike spring water, will demand a construction of express wells.

We know that water is the second for its significance for an organism substance after oxygen. Shortage of water in an organism first of all causes thirst, sickness. And further, with decrease of the amount of water in an organism one can get asthma, spasms of muscles and so on, up to a lethal outcome. Water helps the whole organism to function normally. The main functions of water are:

- keeping the structure and the DNA functions;
- carrying out delivery of oxygen to cells;
- playing a role of the intermediary in delivery of nutrients;
- supplying with means of removal of slags from an organism;
- allowing to maintain normal electrical conductance of cells;

- regulating body temperature;
- supporting the immune system;
- allowing to support a normal ground level of metabolism;
- playing the role of the conductor in the process of removing the free radicals from an organism [3].

The World Health Organization says that 80% of diseases are connected with drinking of low-quality water [1].

Also I would like to pay attention to some projects related to potable water.

To begin with it is necessary to tell about the project of the "United Russia" Party "Pure water" which started in 2010. This project first of all is directed at improvement of quality of potable water, and also at its economy. Tasks of the project include installation of modern equipment for water treatment, supply of the population with bottled water, protection of natural water objects. And still the main goal of the program is improvement of health of the population. For implementation of the project measures are taken for toughening of punishment for pollution of water objects, a close check of quality of bottled water is made, and also the forum "Pure water" was held. It is possible to examine the purposes and tasks on the official site of the party in more detail [4].

One more important project which, unfortunately, was not realized – "Pure water for health of Africans". A lot of people know, how strongly Africa lacks potable water. Life expectancy there directly depends on it. The program strongly depended on the Republic of South Africa, as the country which is mostly supplied with resources. Tasks included export of bottled water from the Republic of South Africa to other countries of the African continent, carrying out hydrological and hydrogeological researches for arrangement of wells and providing the supply of process water for agriculture. It was said that the project could be carried out only by means of the United Nations and the International Monetary Fund. But the project was not realized [3].

The next project which is being developed– "The Baikal project. The turnpike water supply system from Lake Baikal across Russia, to Europe and Asia".

First of all the project must help residents of China where shortage of potable water is sharply felt. And since 1996 water from Lake Baikal has been delivered to the market. But the project is directed not only at the aid to the countries of Asia and Europe. It is necessary to provide Russia with water also. But such large amount of water for deliveries requires the same number of plastic packages. Therefore the project provides construction of the pipeline across Russia and in the countries of Asia and Europe. It will be more economic, environment-friendly and safe. The advantage of the project is that then not only our country but also foreign shareholders and investors will be engaged in protecting the lake [4].

Unfortunately, natural waters are threatened with serious pollution. From time immemorial people have used water objects as ditches. But water has a remarkable property – self-cleaning. This process goes on when pollution is insignificant. With development of industry everything changed. Waters in the rivers and lakes cannot clean themselves any more. They simply do not manage to do it. Because of it a lot of inhabitants of our planet have access only to polluted water. And it leads to numerous diseases and epidemics.

The main reasons for pollution of potable water are:

- microorganisms;
- industrial drains;
- domestic drains;
- oil products;
- agricultural fertilizers [1].

The industrial drains are the main sources of elements, harmful to a human body (salts of heavy metals and radioelements) [3].

Agricultural fertilizers contain a large amount of chlorides and sulfates. The chlorinated water can cause allergies, skin irritations, diseases of a stomach and gullet [2].

Pollution by oil products is the most dangerous. The reasons of such pollution are not only accidents on tankers, but also simply water transport [3].

In general, all pollutants from the soil and the atmosphere anyway get to water.

Also purity of water in the cities will be influenced by malfunction of sewer systems of cleaning. And besides the majority of such systems became outdated long time ago and long ago needed updating.

Of course, first of all, we should try not to allow catastrophic pollution of water. But if water is already polluted, there are the following ways of its cleaning:

- Water ozonization.
- Water disinfecting by ultraviolet rays.
- Thermal method (boiling) [4].

The main thing is to understand that without water life is impossible. We should do our best to protect our main resource. The mankind must learn to struggle not against water pollution consequences, but against its reasons. We are not threatened with lack of water, we are threatened with lack of pure water!

Already now so many people have no access to water. Some experts consider that water can become the main reason of wars in the XXI century. Shortly this natural resource will become something like oil in due time – for one - a source of wealth, for others – the reason for conflicts. It will occur if we do not find the solution to problems of "water hunger" [4].

I sincerely believe that the mankind will be able to find solutions to the problem of shortage of potable water on our planet. I believe that the projects directed at the help to the countries needing this resource will be realized.

We ought to learn to protect water!

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Sukhorukova S.O.

THE ALTERATION OF CHEMICAL COMPOSITION OF GROUNDWATER IN THE MINES OF KIZEL COAL BASIN

Master's student of the Department of Geoecology, Ecological Faculty
RUDN University, Moscow
suhorukova.svetlana@gmail.com

Abstract: The change of hydrogeological conditions on the territory of Kizel Coal Basin resulted in chemical pollution of ground water and subsequent spout of water to the surface that has negative impact on the environment of the region.

Key words: groundwater, coal, mine water, spouting.

The mining industry has made a major contribution to the change of ecological conditions of the Urals. Hydrogeological structure and geochemical characteristics of coal-bearing strata has resulted in the occurrence of acute ecological situation on the territory of Kizel coal basin. The study of this problem has an environmental focus, and the results of experimental studies

aimed at changing the chemical composition of mine waters and decrease of their acidity, have scientific and practical value.

The relevance of the work is to consider the problems during the operation of the coal basin and environmental situation that occurred after the closure of the mines.

The objective of the work is to identify environmental effects that emerged on the post-operational stage of the Kizel coal basin.

Technogenesis is an interrelation of geochemical, sedimentological, biological, hydrogeological and other processes occurring in the upper lithosphere, where the intense engineering activity leads to the changes in the environment. [1, p. 63]

Kizel Coal Basin is situated on the territory of the Perm region, western Ural. The area of the basin is about 1500 sq. km. [2, p. 12]

The relief is hilly low-mountain, gradually rising to the East. The climate of the region is continental. Mountain meadow, brown forest and podzolic soils are the most widespread ones. The area is situated among the taiga dominated by conifer forests. There are also deciduous forests.

The region is represented by rocks of Silurian, Devonian, Carboniferous and Permian periods. The composition of rocks is dominated by carbonate and sulphate components. The total thickness reaches 4000 meters. Hydrodynamic conditions of the surface and underground waters have been changed due to decommissioning of circulating water supply systems and hydraulic units.[3, p. 46]

During the operation of Kizel coal basin mining was restricted by Visean-Bashkirian aquifer. The exhaustion of coal in the upper horizons of mines led to extraction below the level of the fissure-karst waters. This led to the decrease of fissure-karst waters, and changed the direction of aquifer to the entries.

In post-operational stage, mines were filled with groundwater. The formation of mine waters is connected with poorly plugged exploratory wells and the increase of Visean-

Bashkirian aquifer with a modified chemical composition. [3, p. 84]

A feature of the Kizel coal basin is the formation of acid mine water because coal seams contain pyrite.

Acid mine waters have a higher solubility which affects mineralization and the content of elements. Spouting of mine waters is followed by the sedimentation of the iron hydroxide. The area of sedimentation is constantly increasing. Due to huge volume and high content of pollutants, mine waters have a negative impact on the environment of the region.

One of the methods to improve the ecological situation on the territory of Kizel coal basin is the construction of sewage treatment plants with neutralization of acid mine waters. The paper includes the results of experimental neutralization of mine water with lime solution.

The samples of mine water were taken from spouts in Gremyachinsk, Gubakha, mine “Lenina” and mine “40-years of VLKSM”.

According to the results of experimental studies it can be concluded that neutralization of mine water “Lenina” water is the most effective one, initial potential of hydrogen (pH) = 3. Mine water in Gremyachinsk is slightly acidic, pH = 5. The increase of CaO concentration in the mine water is up to 2000mg/l pH = 12. This concentration is the threshold because pH does not change further. Acidic (pH = 3) mine water of Gubakha is changed (pH = 7) when the concentration of CaO is 1000 mg/l. When the concentration of CaO is 740mg/l in mine waters of “40-years of VLKSM”, the pH varies from slightly acid - neutral to alkaline.

Hydrogeological consequences of technogenesis are associated with the decrease of fissure-karst waters of the Visean-Bashkirian aquifer and fissure-stratal waters of the coal measures. The termination of mining and deactivation of dewatering and pumping systems led to the flooding in the mines and gradual recovery of the hydrodynamic regime of Visean-Bashkirian aquifer. The formation of mine water occurred with the altered

chemical composition and the increase of acidity due to the saturation of coal seams by pyrite. The penetration of mine waters to the Visean-Bashkirian aquifer caused the formation of technogenic aquifer, followed by the spouting to the surface. Due to the large volumes and high concentrations of pollutants, mine waters have a strong negative impact on the environment of Kizel coal basin, in particular on surface water. The results of experiment and the dynamics of neutralization process determine the necessity of studying the composition of the mixture and precipitation, which will assess the efficiency of the neutralization method of acidic mine waters of Kizel coal basin.

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5. SOIL CONTAMINATION AND LANDSCAPE RESEARCH

Antropova N.S.[1], *Vodianova M.A.*[2]

CHANGING SOIL MICROBOCENOSIS UNDER ANTI-ICING AGENTS POLLUTION

[1] *Master's student of the Department of System Ecology, Ecological Faculty, RUDN University*
[2] *PhD, Head of the Laboratory of Health of Soil, FSO "Research Institute of Human Ecology and Environmental Health named after A.N. Sysin" of the Ministry of Healthcare of the Russian Federation*
natalia.antropova94@gmail.com

Abstract: Micro-organisms are very sensitive bio-indicators, sharply reacting to various changes in the environment. A large amount of easily soluble salts (sodium and potassium chlorides) enter roadside soil as a result of use of road anti-icing reagents. A detailed study of the soil microbocenosis under the influence of anti-icing reagents will identify indicator species, reflecting the degree of toxicity of the test reagents, as well as expand the list of soil indicators used in determining the hazard class of anti-icing reagents.

Keywords: microbiocenosis, soil, anti-icing reagents, research, fungi, micromycetes.

Microbiological description and soil quality assessment, including the study of the processes of self-purification - the most difficult section of the soil biodiagnostics. Micro-organisms are very sensitive bio-indicators, sharply reacting to various changes in the environment [1]. At present, a lot of studies on the effect of pollutants (oil and petroleum products, polychlorinated biphenyls, heavy metals, other chemical compounds) on soil microflora have been carried out. Unfortunately, the impact of anti-icing reagents on the soil microflora has been insufficiently studied. Of course, in carrying out field investigations it is due to the seasonality of use of reagents, weather conditions, presence of different pollutants in soil, which have been accumulating in the soil throughout the year, regardless of the season, which is reflected

in the combined influence on the soil, neighboring environment and health of population.

It is known that road transport pollution has a significant impact on soil microbiocenosis. Typically, roadside areas experience anthropogenic series of solid and gaseous toxicants: exhaust gases (mainly carbon monoxide, oxides of nitrogen and sulfur, unsaturated hydrocarbons), heavy metals, waste oils, as well as fine dust and soot. Furthermore, a large amount of easily soluble salts (sodium and potassium chlorides) enter roadside soil as a result of use of road anti-icing reagents. This leads to an increase in alkalinity, exogenous salinization, deterioration of soil aeration and moisture permeability.

In hygienic practice in the study of toxic to soil properties of anti-icing agents model experimental research is used based on the Guidelines on the sanitary-microbiological study of the soil, regulating the use of a broad set of indicators that, in turn, allows us to give a comprehensive ecological and hygienic assessment of soil [2 , 3].

From the literature it is known that under the influence of various chemical contaminants complexes of micromycetes of certain species are formed. There is enough information on the biodiversity of microscopic fungi in urban areas. In addition, the material on the changes in the micromycete composition of soils with different levels of salinity has been gathered. The data on soil of natural origin can serve as objects of comparison for urban soils experiencing the condition of salt stress through the use of anti-icing agents [4].

In the model experiment conducted on the basis of the State Organization "Research Institute of Human Ecology and Environmental Hygiene named after A.N. Sysin" of the Russian Ministry of Health, to study the quantitative changes in the main groups of soil microorganisms (saprotrophic bacteria and soil microscopic fungi) under the influence of anti-icing reagents (the mass fraction of calcium chloride - 35%, sodium chloride - 50%,

sodium formate - 8.9% and urea - 5%), the effect of anti-icing reagents on the amount of fungi was 60%.

The fungi of the genus Aspergillus (A.niger and A. Versicolor) bearing spores were found in the sample. Aspergillus niger - a pathogenic fungus-saprophyte, such fungi are the cause of the disease called aspergillosis, as well as the cause of an allergic reaction that leads to allergic rhinitis, allergic bronchopulmonary aspergillosis or bronchial asthma.

In the study of the influence of anti-icing reagents on soil micromycetes the following composition of fungi genera was distinguished: Mucor, Absidia, Fusarium, Penicillium, Rhizopus, Trichoderma, Epicoccum, Alternaria, Aspergillus.

Thus, the relevant area of research is a detailed study of the soil microbocenosis under the influence of anti-icing reagents that will identify indicator species for them, reflecting the degree of toxicity of the test reagents, as well as expand the list of soil indicators used in determining the hazard class of anti-icing reagents.

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Evstegneev A.V.

ASSESSMENT OF OIL SPILLS ENVIRONMENTAL IMPACT

Russia
Post-graduate student of the Ecological faculty
RUDN University, Moscow
avevstegneev@mail.ru

Abstract: Environmental damage of a simulated oil spill accident has been calculated and the cost of a complete elimination of a liquid petroleum hydrocarbon spill has been estimated on the example of the Samotlor field, Russia.

Key words: damage to soil covers

Oil production is often associated with emergency incidents, inspection of equipment and pipelines is the must, their upgrade and maintenance must achieve the state of the art, or the elimination of the consequences would be extremely expensive.

The target of the study is to calculate the environmental damage and estimate the cost of a complete elimination of a liquid petroleum hydrocarbon spill. Damage to soil covers has been studied on the example of the Samotlor field, launched in 1968, located in the Khanty-Mansi Autonomous District, Russia. Estimated geological reserves proved recoverable are of 2.7 billion tons.

The first step was to petroleum composition at the Samotlor field: sulfur, resin silica gel, asphaltenes, paraffins; the concentration of chloride salts. At different boiling temperature of oil petrol, aviation fuel, tractor fuel and rocket fuel can be extracted.

The second step was the description of properties of oil at the Samotlor field, known as the ESPO grade: Density at 20◦C 833,0-881,0 kg/m3; Viscosity 4,41-21,72 mm2/s at 20◦C, 2,45-6,59 mm2/s at 50◦C; Molar mass, 163,0 – 252,0 kg/k-mol (the average value 196,5 kg/k-mol, the standard deviation 14,9); Congelation temperature, -30 – 0 ◦C (average -10,8◦C); Initial boiling point temperature, 46 – 66 ◦C (average 53,7◦C). The oil has high enough density and viscosity to be easily absorbed into the soil, especially at high temperatures, and solidifies at a sufficiently wide range of low temperatures.

The third step of the study was to reveal the oil impact on the environment. The main effects are the following:

1) Forest land pollution by oil: individual trees deaths (4% pollution of the forest area); conifers death (at 40%); complete destruction of vegetation (at 60%).

2) Water pollution by oil (concentration of 1% in water): aquatic plants death; fish meat acquiring the smell of oil.

3) Impact of oil deposits: trees wither within a radius of 3 km from the gas flare; accumulation of heavy metals in soils

(mainly lead, nickel, cobalt); soil contamination with highly toxic components such as antimony, arsenic, barium, cadmium, chromium, cobalt, copper, fluoride, lead, mercury, nickel, vanadium, zinc.

Oil pollution of the soil also results in the destruction of soil structure and dehydration.

The fourth step consisted in a simulated accident at the Samotlor field (see Table 1) and calculation of its consequences (see Table 2).

Table 1. Results of calculation of the oil which has poured out at accident

№	Characteristics	Design formula	Quantity
1	Volume of oil spill between the moment of detection of the pipeline damage and a moment of transfer stop	V1 = Q1 * T0	V1 = 30,4 m3; M1=29,5 t.
2	Volume of oil spilled from the pipeline between the moment of transfer stop and closing of latches	Q2=$\mu\omega\sqrt{2gh}$	V2=171.4 m3; M2= 145.7 t.
3	Volume of oil spilled from the pipeline between the moment of closing of latches and leak termination	V3 = π * DBH * L/4	V3=763.3 m3; M3= 648.8 t.
4	Total of the flowed-out oil	V= V1+V2+V3 M=M1+M2+M3	V=965.1 m3; M = 824 t.

Table 2. Counting the cost of expenses for liquidation of consequences of the accident

№	Characteristics	Design formula	Total
1	Calculation of quantity and cost of UVO-1 cars	313,1 m3 \ 10 m3 32 * 28 000 ₽/shift	32 cars 896 000₽
2	Calculation of quantity and cost of a sorbent of "Uremiks-913"	70*1000/0,4 1750 *25 ₽/kg	1750 kg 437 500₽
3	Calculation of quantity and cost of cars for export of waste	82 m3 / 10 m3 9 * 18 000 ₽/shift	9 cars 162 000₽
4	Calculation of cost of elimination of waste	(313, 1 m3 + 82 m3) * 850 ₽/m3	335 835₽
5	Calculation of cost of application of a bacterial preparation BAK-VERAD	308,9 m3 * 110$ * 67₽	2 276 593₽
6	Calculation of cost of crops of a sedge	97 000 kg * 10 ₽/kg	970 000₽
7	Calculation of the fine	263.7 т * 44 $ * 10 * 67 ₽	7 773 876₽
8	Calculation of the total amount for elimination of the accident	S=S1+S2+S3+ S4+S5+S6+S7	12 851 676₽

The stage 6 is optional. The damaged sections of the soil are sowed by special herbs, which development leads to mineralization of petroleum hydrocarbons. In this case, the soil is most suitable for seeding sedge. The area of seeding is 9.7 ha => 97 000 m2, planting cost is 10₽ per 1 m2.

During the simulated accident 824 t of oil have poured out that has caused pollution of 9,7 hectares of the soil and formation of the 10 mm oil film The fine exceeds the cost of liquidation of the accident. This suggests that companies are not worth saving on routine inspection and must upgrade equipment and pipelines.

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Golovanov M.

ASSESSMENT OF LANDSLIDE PROCESSES IN KOLOMENSKOYE PARK IN MOSCOW

Estonia
Master's student, Ecological Faculty,
RUDN University , Moscow
markgol53@gmail.com

Abstract: The landslide situation in Kolomenskoye Park in Moscow is considered. Kolomenskoe Park is one of the areas of wide distribution of landslide processes. Assessment of the slope stability is needed in many fields of human activity.

Key words: landslide, slope, coefficient of stability, calculations, Kolomenskoye, software.

When designing any anti-landslide measures, during construction on the unstable slopes or during placement of the mechanisms on the slopes and on the sides of ravines the work should begin with assessment of the stability of the sloping surface of the earth. Landslides that occur when the load on the slope increases are some of the most dangerous exogenous processes for humans. The necessary assessment is performed by calculating the coefficient of stability. It is characterized by the ratio of the forces holding the soil on the sloping surface to the forces that shift the soil.

To conduct the assessment NPP "Singeos" developed a computer program named PSK in 1992. This program searches the surface for the offset with the minimum coefficient of stability that provides higher accuracy in assessment of stability.

The area of research is located on the right Bank of the Moskva river within the South-Eastern district of Moscow, East of the Avenue of Andropov in the central part of the territory of the State Museum-reserve Kolomenskoye. In terms of geomorphology on the site of surveys there is the watershed plateau complicated by large extended Dvortsov and Dyakov ravines, the slope to the Moskva river and the floodplain.

In general the research area has been studied in a lopsided manner. Local areas studied well using different methods are combined with the poorly studied areas especially in relation to deep drilling. Thus, despite the large amount of available information on the geological structure and engineering geological conditions of the territory the existing data (column wells, engineering geological and hydrogeological parameters of the sediments, the data on the level regime of aquifers) is often very incomplete and contradictory. The time interval of drilling of wells is very large in the area of work. From the beginning of the 1960s up to the present time there were changes in the geological and stratigraphic scheme of the area.

Engineering geological conditions of the survey territory are very difficult. The area is disturbed by large deep-laid landslides. There are no linked records of its geological structure. There is poorly preserved actual drilling data and laboratory testing of soils for the period up to 2000. Engineering geological knowledge of the area Kolomenskoye should be considered as insufficient.

According to the regulations the calculation is performed by 4 different methods on arbitrary and troglocimmerites offset surfaces using the software complex PSK and the program of earth slopes stability calculation for troglocimmerites sliding surfaces. These programs allow automatic retrieval of the

displacement surface (actual or potential) with a minimum coefficient of the slope stability.

Multiple calculations are needed for the analysis of various options for the slopes layout, during placement of the retaining structures, during evaluating of the effect of drainage, etc.

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Kaganova Yu.A.

ENVIRONMENTAL REQUIREMENTS AND CRITERIA FOR SOIL COVER OF IRRIGATED BLACK SOIL

Russia
Master's student, Ecological Faculty
RUDN University, Moscow
Yuliakaganova@gmail.com

Abstract: Environmental requirements for irrigation include the minimization of anthropogenic impact on all components of the natural environment while ensuring optimal reclamation regime. For the soil it is necessary to ensure an optimal hydrothermal regime, the creation of optimal water, saline, nutrient, humus and other conditions, the conservation of biological diversity, soil fertility and increase the biological productivity of the soil.

Key words: irrigated soils, black soil, soil fertility, environmental requirements, hydrothermal regime, humus washout.

Introduction**.** In modern conditions expanded reproduction of soil fertility should be a global goal of rational land reclamation for agricultural crops at economical expenditure of natural resources with the exclusion or compensation of environmental damage.

By its properties black soil is the most fertile one, therefore maintaining and increasing the fertility of chernozems are an important task.

Methodology**.** Criteria for environmental requirements include:

1. Optimal hydrothermal regime of irrigated soils ($\overline{R}$)

$$\overline{R} = R / (L (Oc + Op + W)), \quad (1)$$

R -radiation balance, kcal / $cm^3 \cdot$ year;

L -hide heat of vaporization, kJ / cm^3;

Oc - precipitation, cm;

Op - the value of irrigation rate, cm;

W - an additional amount of water obtained through the use of "dry" land improvements.

Value $\overline{R}$ is based on the ecological requirements of plants, reproduction conditions of soil humus reserves, obtaining high yields and minimal violation of natural biogeochemical fluxes. The optimum value $\overline{R}$ considering soil-climatic zones is 0,9-1,1 (Figure 1).

2. Optimal water, saline, nutrient and humus regimes in the soil.

a) The criteria for soil water regime are:

- the limits of moisture changes in the root zone;
- the depth of the groundwater level;
- moisture exchange between the soil and groundwater.

Indicative limits of soil moisture control for most crops are (0.6 - 0.9) maximum moisture ratio.

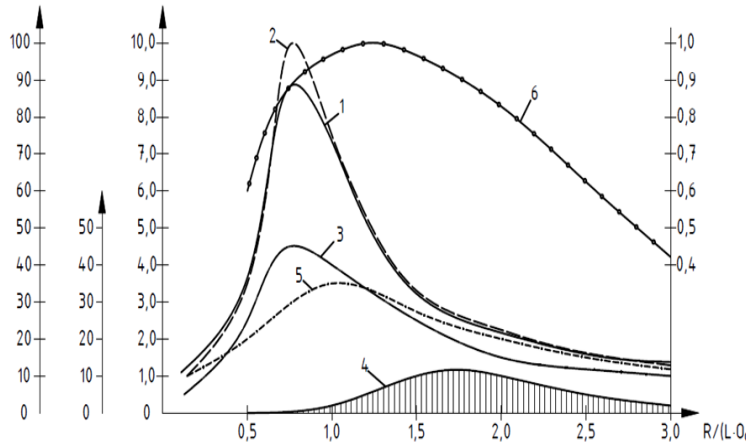

Figure 1. Dependence of the basic properties of the soil by hydrothermal regime: 1-content of water-stable aggregates: 2 - humus content in the layer 0-50 cm; 3 - absorption capacity; 4 - spread solonetzes; 5 - particle content of d <0,001 mm; 6 - relative productivity of vegetation.

Moisture exchange (g) between the soil and groundwater at the groundwater table ≥5m is determined by the formula depending on the average moisture of the root zone (W) and must not exceed 0,05 Ev [1]:

$$g=K_0\left(\frac{ПВ'-Wc}{m-W}\right)^n\left(\frac{W-Wo}{ПВ'-Wo}\right)^n\cdot T, \qquad (2)$$

Ev - the sum of evaporation from the field, m;

K_0- coefficient of filtration soil-ground, m/day;

ПВ' = m - a;

m - soil porosity, a proportion of volume (p.o.v);

a - entrapped air, p.o.v. (0.05 - 0.10)

Wo - the maximum molecular moisture capacity, p.o.v.;

W - the current moisture in the soil, p.o.v.;

n - coefficient depending on the type of soil and its texture, for ordinary chernozems n = 5;

T - the billing period, d;

b) The criteria of salt regime of soil are:

- chemical composition and mineralization of soil solution (CO_3, HCO_3, Cl, SO_4, Na, Ca, Mg);

- composition absorbed cations (Na, Ca, Mg);

-reaction of soil (pH).

c) The criteria for nutrient and humus conditions of irrigated soils are:

- the composition and dosage of applied mineral fertilizers (NPK);

- humus washout through infiltration water.

Ingredients and doses of fertilizers are based on agronomic service requirements of environmental protection and quality of agricultural products.

Soil humus washout and its compensation is estimated from the dependence on application of organic fertilizers (3) [3]:

$$Гg=g\cdot C_г, \quad (3)$$

Гg - humus washout through infiltration water, kg/ha;

g - infiltration of irrigation water, m^3/ha;

$C_г$ - concentration of soluble humus in the soil solution, kg/m^3

3. Biodiversity conservation and reproduction of soil fertility.

It includes crop structure, conservation tillage, agronomical measures and forestry engineering, which depend on water and wind potential. The composition of crop rotations and diversity of crops should be based on the conditions of maximum efficiency of soil protection.

Agronomical measures include moldboard plowing, slotting, mulching.

Agronomic reclamation in the steppe zone include strips of forest, which is a main indicator of the wind weakening.

In conclusion Plowing chernozems and their agricultural development leads to decrease of productivity of the soil and increase of organic matter mineralization. Removing a large part of the biomass from the field with crops contributes to this process, also humus in the root zone is washed out by irrigation.

Reasonable irrigation contributes to the accumulation of organic matter in the soil and improves its fertility.

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Palatkin I.S[1]., Oziev M.A[2].

MIGRATION AND DEGRADATION OF SIMAZINE IN SOIL

Russia

[1]Bachelor`s student, Ecological faculty

RUDN University, Moscow

i.palatkin@mail.ru

[2]Bachelor`s student of the Ecological faculty

RUDN University, Moscow

oziev_magomed@mail.ru

Abstract: The purpose of this article is to demonstrate the factors, which the migration and degradation of simazine in soils depend on.

Key words: simazine, herbicide, fertilizer, triazine, soil, influence, inactivation.

Simazine is a herbicide of the triazine class. The compound is used to control broad-leaved weeds and annual grasses.

Simazine, which has a low solubility, is actively absorbed by soil, it migrates through the soil profile to a depth. By this measure it can be classified as moderately mobile pesticide [1].

Moreover, the transference of the pesticide is more limited by its sorption than by its solubility. Many researchers believe that the transference of herbicides in soil is due to the diffusion of soil moisture and air [2]. The basic significance of non-volatile simazine is diffusion in the liquid phase, therefore, in soils saturated with moisture, diffusion conditions are better and in such soils they migrate easier. The number and intensity of rain affect the transference of triazinone herbicides. Thus, in Volgograd region simazine was washed to a depth of 10-15 cm for 2 spring months after application of fertilizers, in the presence of precipitation, (the higher the dose, the deeper layers revealed the herbicide), and in the absence of precipitation the fertilizer remains in the upper layer. In the temperate climate zone, the depth of penetration of simazine is 10-15 cm, sometimes the residual amount of the herbicide is detected at a depth of 25-30 cm if the doses of introduction are large and wetting of the soil sediments is intensive. In the area of high humidity, for example in humid subtropics of Georgia, simazine can penetrate to a depth of 30-40 cm. At a depth of 30 cm residual amount triazine is found when it is applied to the soil on the same plot for several years. However, in the deeper layers of the soil the minor residual amounts of simazine are detected, but the bulk of them (about 80-90 % of the total content) is in the top layer (0-10 cm). With the development of erosion processes a significant removal of pesticides is possible in connection with fine-disperse soil material to nearby environmental objects.

Migration of simazine in natural conditions might be mainly composed of fine-dispersed material, because the bulk of simazine in the soil is in adsorbed state.

Simazine has a fairly high persistence. By the classification of N.N. Melnikov it should be attributed to the group of the most dangerous pesticides that can remain in the environment for more than 2 years [3].The sim-triazines` duration of decomposition and disappearance from the soil depends on many factors: the chemical structure of the substance, formulations, technology of introduction, climatic and soil factors, the availability and composition of plants and others.

Simazine persists in soil during the vegetation period, reveals during the following year after application; the retention time of simazine persistence in soil in most cases is 2-3 years. Especially simazine residues are often found by their phytotoxic impact on sensitive cultures planted in the areas, which in previous years were treated with this herbicide [2].

The degradation rate of simazine depends on the temperature in a very large extent. Experiments have shown that simazine is almost not subject to decay at temperatures below 10°C. In the temperate zone with a small amount of precipitation simazine persists in soil for the second and third years, even if you make it in a small dose. With increasing temperature, especially if there is a fairly high humidity, the rate of decomposition of herbicides, particularly simazine, is quite high. Thus, the fertilizer is decomposed in 3-5 months in the wet subtropics at high temperatures (above 20°) even at very high doses (20 kg/ha). The rate of inactivation to full field moisture is particularly significant at temperatures from 40°C to 60°C and humidity from 60% [4].

The type of soil and its content of organic substances also influence the rate of inactivation of the herbicide. Thus, in sod-podzolic and grey forest podzolic soils decomposition rate of simazine was lower than in black soil.

Prolonged use of the herbicide on the single place, especially in large doses, leads to its significant accumulation in soils. Long-term use of simazine on the same place can lead to adverse effects on the plants, which were under its influence [5].

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Sabirzyanova A.D.[1], Aleinikova A.M.[2]

THE DYNAMICS OF THE TUAPKHAT MASSIF COASTAL ZONE FOR THE PERIOD 2014-2016

[1]Master's Student of the Department of Geoecology, Ecological Faculty
[2]Assistant Professor of the Department of Geoecology, Ecological Faculty
RUDN University, Moscow
alishka_sabir@mail.ru; *anshur@mail.ru*

Abstract: Route systematic monitoring of the state coastal zone is necessary not only for scientific purposes but also to ensure the safety of people in the

area. Such geological hazards as downfalls, landslides, rockfalls, may represent a significant threat to human life.

Key words: coastal zone, Tuapkhat massif, flysch formations, abrasion, weathering, denudation, rockfalls, landslides.

The aim of the work is the study of the Tuapkhat massif coastal zone dynamics for the period of 2014-2016.

The main research methods: route monitoring with the system of complex landscape-geomorphological descriptions, geotagging and photography; literature analysis.

The object of research is the coastal zone at the bottom of the coastal slopes of the southerly aspect of the Tuapkhat massif. As for geomorphology, this area is located on the southern slope of the Greater Caucasus Mountain Range. The investigated Land belongs to Novorossiysk low-mountain inverted infolded landform. The massif is composed mostly of sandstone, limestone, marl and mudstone Cretaceous sediments. [1] 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 there are 75 investigation points.

It should be noted, that the investigated slope of the Tuapkhat array is characterized by the diversity of flysch deposits. A lot of tectonic crumpling and fractures, folds, thrusts, and the constantly changing angle of flysch embedding make this massif unique and increases the scientific value and interest in detailed study of geoecological features of the Tuapkhat massif [picture 1].

Within the field observation at each point of landscape–geomorphological description of the Tuapkhat massif coastal zone the following measures were taken: the beach width, the beach height, the size of pebbles, number of terraces (if available), width and height of the terraces, the size of a pebble on each terrace, the geological features of the beach, the amount and type of debris.

Picture 1: Tuapkhat massif, fissure 5.

After analyzing the data in 2014 and 2016, we can conclude that there have been numerous, but not obviously expressed changes during this period of time. There are some modifications in the width and height of the beaches, and in the presence of terraces, however, large rockfalls and landslides exactly retained their location. There are are photos below, where small erosion of the landslide in 2016 can be noted, due to the wave action of the sea [picture 2].

Also, small rockfalls and landslides were noted. The intensity of exogenous processes such as abrasion, denudation and weathering can be seen on further photos, which show a significant destruction of the flysch layer by 2016 and the accumulation of the flysch sediments in the abrasion window.

Picture 2: Landslide at point 11 in 2014
Picture 3: Landslide at point 11 in 2016

Picture 4: Abrasion window in 2014

Picture 5: Abrasion window in 2016

It should be noted that besides exogenous processes, the anthropogenic factor has a significant influence on the state of the Tuapkhat massif, because this area is actively used for human recreation.

Thus, on the basis of this material, it can be concluded that the slopes of the massif are constantly exposed to the destroying influence both of negative exogenous natural processes and anthropogenic processes. Even in such a short period of time as 2 years, destructive changes are observed in the geomorphological structure of the Tuapkhat massif. Therefore, there is a need for measures to protect the coastal zone. From an environmental point of view, the unlawful fact is the “quiet” housing development of the Tuapkhat massif unique natural complex, because it causes harm and destruction of Red Book species such as the pine of Pitsunda and other unique species of the Tuapkhat massif.

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Shunenkova K.O.

KARST HAZARD ASSESSMENT OF THE PROSPECTIVE CONSTRUCTION SITE OF NIZHNY NOVGOROD NPP

Master's student of the Department of Geoecology, Ecological Faculty
RUDN University, Moscow
ksenya93-07@mail.ru

Abstract: The problem of karst risk assessment is very important for Russia. Among the most hazardous regions there is Nizhny Novgorod. Federal Standards of the Russian include the requirement of mandatory assessment of the risks induced by natural processes in order to make sure their values do not exceed acceptable limits.

Key words: karst, risk, sinkhole, antikarst protection, Nizhny Novgorod

The growing needs of mankind for energy resources makes it necessary to replenish them, and, in particularly, through the construction of nuclear power plants (NPP). Construction and particularly operation of nuclear power plants requires a careful study of engineering-geological conditions of the territory. Now the decision on the construction of Nizhny Novgorod NPP is made.

There are a variety of modern geological processes on the territory of the prospecctive nuclear power plant, but the most dangerous is the karst. Therefore, studies to assess the karst hazard within the proposed construction, are topical and practically significant. In accordance with the technological normative documents karst areas must be considered unfavorable for the construction of NPP. In this regard, the possible aspects and associated karst hazard should be assessed.

The territory of the projected construction of NPP is situated in Navashino district of Nizhny Novgorod region. It is located on the right bank of the river Oka. The climate is temperate continental. The soil cover is represented by dark gray and light gray forest, podzolic and floodplain meadow soils. The

work area is located on the border of forest-steppe zone of transition to the zone of mixed forests.

The geological structure of the area is comprised with Permian sediments and quaternary formations. Perm system is represented by deposits of Sakmarian, Kazan and Urzhum stages. The geological section is represented by carbonate and sulfate-carbonate strata of the Permian system, covered with Quaternary sediments.

During the study of the safety analysis report, it was found that there are 335 surface karst forms on the territory of 16 square kilometers, where the main and auxiliary facilities of the NPP should be located. Karst assesment was perfomed on the results of surveys of the area using research materials of the previous years. Cavernous porosity of the Earth's surface is represented by the presence of karst landforms. To assess karst hazard the methodology proposed by Savarenskiy and Mironov was chosen. In accordance with the methodology for assessing the sustainability of the territory of the proposed construction of nuclear power plant against failures and the subsidence of Earth's surface a map of distance from the sinkholes was built. The essence of the method is to construct a contour around each sinkhole with a selected radius of distance R.

The distance radius was chosen at random, based on the area of the study territory and the scale of the map. In this case, it is convenient to take R = 250, 500, 750 and 1000 m. For constructing the contours around each funnel a circle was circumscribed with the selected radius distance R (R = 250 m, R = 500 m, R = 750, m R = 1000).Where the distance between the sinkholes is smaller than 2R, drawn circles overlapped, forming a single circuit, and where the distance is greater than 2R, an isolated circle was formed. For each selected areas the values of the basic parameters were calculated. They are the density of the sinkholes, the area of the sinkholes, the intensity of the sinkhole formation and the average diametre of the sinkholes.

Further, based on the values of the intensity and taking into account the radius of the nearest karst formation areas of 4 types were highlighted. They are red (R = 250 m), orange (R = 500m), yellow (R = 750 m), and green (R = 1000).

Areas with the largest distance radius (R = 1000 m) belong to the V category of stability, indicating that the construction of buildings and structures of high level of responsibility on such territory is acceptable. Basic facilities and nuclear reactors will be located on the area where the distance from the nearest karst form is more than 1000 m, which also proves the security of the selected site from the viewpoint of sinkholes.

Thus, with the distance from the manifestations of karst, the resistance of the ground increases. Thereby, the maximum resistance is observed from outside the area with a radius R = 1000. The analysis of karst spread and development on the territory of Nizhny Novgorod NPP showed that karst processes do not take place directly on the territory of the NPP and the construction site is not affected by karst processes.

These results definitely prove that at the selected site the geotechnical conditions are unfavorable for the natural development of karst, and at the construction site the development of karst and karst-suffusion processes are virtually eliminated.

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6. PRIORITY AREAS OF SUSTAINABLE FOREST MANAGEMENT

Drygval A.V.

CHARACTERISTIC OF THE BROAD-LEAVED FORESTS

Russia,
Bachelor's student,
RUDN University
drygval95@mail.ru

Abstract: Broad-leaved forest is a very important object on our planet. In spite of all the environmental features of their habitat and human-induced pressures they were preserved. These forests are not only an important producer of oxygen, but also have a value as an economic resource (wood). The main goal of human is finding a balance between the preservation of broad-leaved forests and economic gain. This article describes the features of growing broad-leaved forests and some of their environmental problems.

Key words: broad-leaved forest, thermophilic threes, fertile brown soil, gray forest soil, mild temperate continental climate, ecological problems.

Broad-leaved forest is a kind of deciduous forests are formed by deciduous trees with broad leaves. [1] This fact explains why deciduous trees are quite a thermophilic, they can not stand the harsh continental climate.

The next section is devoted to the geographical position of the broad-leaved forests. Broad-leaved forests grow in wet and moderately wet areas of temperate climate with weakened continentality, uniform precipitation throughout the year and relatively high temperatures. [1] They occupy the east of North America, Central Europe, East China; also form a high-altitude area in the Carpathians, the Crimea and the Caucasus. [4] In South America they are growing in Patagonia. [3] In addition, the separate focuses of deciduous forests found in the Far East of Russia, Chile, New Zealand and in the center of Japan. [4]

The climate in these areas rather mild, temperate continental, it is largely determined by the relatively warm and

wet air. [2] Broad-leaved forests are deciduous; however they are not adapted to the severe winters. [5] The average January temperature must be approximately -8 ° -0 ° C, in July + 20-24 ° C. [4] Moistening coefficient is approximately equal to 1 - the water evaporates as much falls as precipitation. The average rainfall for the deciduous forests is about 450 - 550 mm per year. Annual precipitation evenly distributes throughout the year and reduces the level of wetland soils. [1]

Flora is represented by a variety of broad-leaved trees, shrubs and herbs. The leaves on the trees have a wide plate, that why these are called broad-leaved forests. The size and shape of the leaves vary very little that distinguishes them from the rainforest trees. Leaves do not adapt to the adverse winter time and fall off, this shows the protection of trees against excessive evaporation in winter (winter is cold and the ground is dry physiologically). The trunks and branches of trees protected by thick bark and buds cover dense scales, often resinous scales. This is protection from the winter evaporation too. Broad-leaved forests in most cases are longlining.[1] Fauna is represented by a large number of mammals.

Areas of broad-leaved forests are traditional farming. Primary forests are cut down almost everywhere and areas under cultivation. However, the chemistry of natural landscapes (big role leaching processes) does not provide the necessary level of development of agriculture and higher crop productivity without constant fertilization. Especially important are nitrogen and phosphate fertilizers, sometimes also potash. [3] Also, a significant part of forests has been reduced to building cities, crops and grazing. Today, many species of animals and plants of the area are on the verge of extinction. [5]

The broad-leaved forests have some ecological problems. The area of broad-leaved forests, at least in the Russian plain, has experienced a great anthropogenic transformation. Oak forests, which still XVII century almost continuous strip stretched from the upper reaches of the Oka to the Urals, have almost reduced.

Areas were occupied by them earlier between the rivers with fertile gray forest soils are cultivated or at overgrown with secondary birch and aspen forests with admixture of oak, linden, maple and ash (to the Volga). In some places, including the Central Russian Upland and Oka-Don plain, formed groves of oak with an admixture of linden trees and other deciduous trees. Landscapes acquired forest steppe image.

Summing up all the above, it becomes clear, that the territory of broad-leaved forests is inhabited and largely is brought to naught. It has been preserved only in a rugged, unsuitable for tillage areas and nature reserves.

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Drygval P.V.

CHARACTERISTIC OF THE TAIGA ZONE

Russia,
Bachelor's student,
RUDN University
any-poly@mail.ru

Abstract: Coniferous trees are well adapted to growing in harsh northern conditions. Special environmental conditions determine existence of forests, which forming the taiga zone. Taiga is main producer of oxygen in our planet. This article describes the main features of growing taiga forests.

Key words: taiga, coniferous trees, pine, larch, northern.

Taiga is located in the middling humid geographical area. Coniferous trees are the basic vegetation form in the taiga. Swamps are one of the main characteristic of the taiga – they are covered the northern Siberia and the continental part of Canada.

Taiga is the largest land biome in the world, it has an area about 15 million square kilometers. Taiga is also the largest landscape zone in Russian. Its width in the European part of Russia is about 800 km, and in Western and Eastern Siberia is about 2150 km. Most of the Western and Eastern Siberia, the Far East, mountains of northern and middle Urals, Altai, Sayan, Baikal region, northern Sikhote-Alin and etc. are covered with taiga forests.

Taiga shares (in the direction from south to north) in three subzones: southern, central and northern. The dominant plants in the northern taiga are short and sparse spruces and pines, in the central taiga grow mostly spruce-bilberries. Southern taiga has much more various vegetation forms.

The species composition of light taiga is scotch pine (*Pinus sylvestris*), some American species of pine, Siberian larch (*Larix sibirica*), Dahurian larch (*Larix gmelinii*). Dark taiga is more prevalence and consists of spruces, firs, cedar pines (*Pinus*

sibirica), Korean pines (*Pinus koraiensis*). However tree species can form pure and mixed forest [1].

Taiga is located in two climatic zones - temperate and subarctic. The radiation balance in the north part of zone for the year is 900-1000 mJ/m^2, in the south part of zone for the year is 1400-1600 mJ/m^2 (near Irkutsk). Continental air flows dominate over the whole area of temperate latitudes. But cold air flows from the Arctic cause a sharp decline of temperature [2].

In the Russian taiga zone many lowland rivers originate - the Volga, Onega, Northern Dvina, Vyatka, Kama, Lena, Viluy and other Russian largest rivers. Ob, Yenisei and Lena cross taiga from south to north.

The Russian taiga zone has a lot of marshes, lakes and large reservoirs (Rybinsk, Kama, Bratsk, Vilyui and etc.). Taiga is rich with groundwater. All the natural complexes of taiga have sufficient and excessive humidification. Thus, the heat and humidity determines the development of vegetation and soil [2].

July and August has maximum precipitation in the taiga. Their annual amount varies from 600-700 mm in the west to 400-350 mm in the Central Yakutia, and in the Far East rises again to 600-900 mm. Precipitation exceeds evaporation. This is cause the increase surface water and logging areas. [2] Permafrost also contributes to stagnation of water. Therefore, a significant part of the taiga zone occupied by lakes, swamps and marshy forests [3].

The vegetation of taiga landscapes is represented by coniferous forests. There are two main groups - the dark and light coniferous forests. First produced shade-tolerant species - spruce and fir trees, creating a dark and gloomy forests. Light coniferous forests consist of pine and larch. [4]

Species composition of the western and eastern taiga different: European spruce (*Picea abies*), Siberian spruce (*Picea obovata*), larch Sukachev (*Larix sukaczewii Dylis*), Dahurian larch (*Larix gmelinii*). Pine forests spread across the taiga zone mostly on the sands and gravelly substrate. There are also deciduous trees mix with pines, especially birch, aspen, alder [2].

Coniferous forests in North America are more various in composition than the European and Siberian forests. Here are many kinds of pine, spruce, fir, larch and juniper and many other special types of trees. All coniferous trees secrete resin-balsamic substances, which are important in saving from microorganisms and insects. Volatiles are specific substances too, that create an odor in taiga forests [2].

The fauna of the taiga zone in Eurasia is very rich. It is home for both large predators. Taiga in North American is characterized by a mild climate, so the species composition of the animals there are very various. Brown Bears - typical inhabitants of the forests in North America [5].

Taiga is a forest area, where coniferous trees dominate, as deciduous trees are not adapted to such harsh conditions.

This natural area provides a large amount of oxygen in the atmosphere, so taiga is often called the green lungs of our planet.

Also there are stocks of industrial wood, large deposits of minerals resources (coal oil, gas, etc.) concentrated in taiga zones [3]. The conditions of these forests influence on the oxygen and the carbon balance in atmosphere.

There were created a number of nature reserves and national parks (Wood Buffalo, Barguzin reserve and others) for the protection and studying of typical and unique natural landscapes of the taiga in North America and Eurasia.

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Glukhova K. A.

CHARACTERISTIC OF HERBACEOUS PLANTS OF PINE FORESTS.

Master's student of the Department of System Ecology, Ecological Faculty, RUDN University, Moscow
ksu_alexiss@mail.ru

Abstract: In this article the results of studying biomorphological range of plants of some pine forests of Russia are described. Data on species diversity of the studied habitats are submitted.

Keywords: plants, life forms, pine forests, recreational loading.

The area of the woods in Russia makes more than 809 million 90 thousand hectares [1], 17% of them are pine forests where the dominating breed is the Scotch pine *(Pinus sylvestris)*. Biodiversity of pine forests is the topical issue of modern phytocenology in connection with continuous anthropogenous transformation of forest ecosystems.

The purpose of this article was drawing up biomorphological range of plants of pine forests. Species diversity of pine forests of national park "Smolenskoye Poozerye", Zvenigorod and six Moscow parks (the Alyoshkinsky park, national park "Losiny Ostrov",

Silver pine forest, the Sokolniki park, the Biryulyovo arboretum) were investigated. Summary species lists taking into account route observations and geobotanical descriptions were made (by standard technique).

For types life forms of herbaceous plants on the I.G Serebryakov system were established. [2; 3]. 13 geobotanical descriptions were made.

Life-form of plants - the set of external morphological features of plant reflecting its fitness to environmental conditions [4]. When comparing life-forms of control habitat (NP Smolenskoye Poozerye) with other habitats it is possible to reveal disturbance of range of life-forms of the latter.

Total number of species of herbaceous plants on all habitats made 65 types, in national park "Smolenskoye Poozerye" - 43 look, in Zvenigorod - 19, in the Alyoshkinsky park - 21, in Silver pine wood - 16, in national park "Losiny island" - 12, in the Biryulyovo arboretum - 12 and in the Sokolniki park - 12 (totally in all Moscow parks - 73).

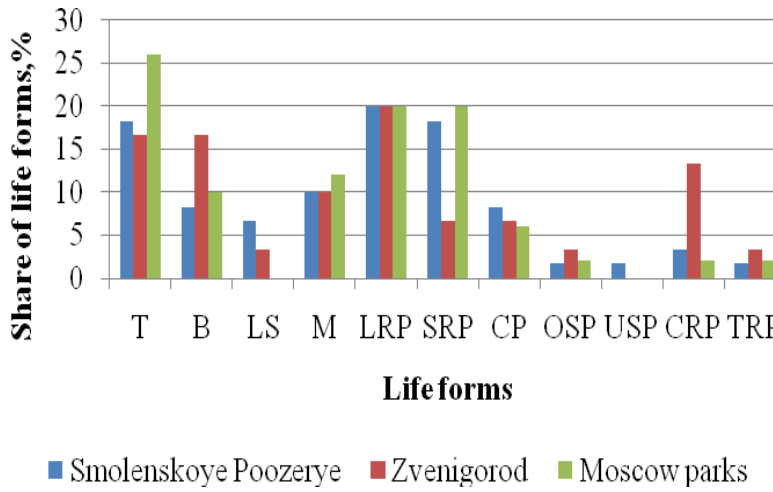

Fig. 1 Ratio of life-forms of plants in pine forests on the I.G. Serebryakov system.

Symbols: T - trees, B - bush, LS - low shrub, the M – grassy monocarpics, LRP - longue rhizome polycarpics, SRP -

short rhizome polycarpics, CP – cespitose polycarpics**,** OSP - overground stoloniferous polycarpics, USP – underground stoloniferous polycarpics, CRP – creeping polycarpics, TRP - tap root polycarpics.

By consideration of ratio of life forms of plants (fig. 1) all studied habitats the following patterns come to light. Dominance of grassy polycarpics is obvious that which is typical for the woods. At " Smolenskoye Poozerye" and Zvenigorod there are low shrubs.

The bigger share of low shrubs in these habitats is, the less signs of recreational load are there. In the Biryulyovo arboretum there are no bushes also - most likely, it is connected with the fact that this is the habitat with the most dense footpath network and poor species composition. This habitat is the one most injured by recreational activity of people (among the studied habitats).

The share of longue rhizome herbaceous plants (for example, *Veronica chamaedrys*, *Pteridium aquilinum*, *Equisetum sylvaticum*, etc.) is identical in all habitats. It is remarkable that in NP Smolenskoye Poozerye and in the Moscow parks the second place is taken by short rhizome polycarpics (*Dryopteris carthusiana*, *Plantago lanceolata*, etc.).

However in Zvenigorod we can notice obvious dominance of creeping polycarpics (*Oxalis acetosella*, *Veronica officinalis*, etc.). It can be connected with the fact that this place is on steep slope of Moscow river.

In Zvenigorod and parks of Moscow there are no underground stoloniferous types. It is possible to assume that it results from consolidation of surface soil horizons as a result of recreational load. In soils aeration process is broken.

The range of life-forms of pine forests in NP Smolenskoye Poozerye is richer, than in the Moscow parks. Out of grassy polycarpics longue rhizome and short rhizome plants prevail. The third place in national park "Smolenskoye Poozerye" and in the Moscow parks is occupied by cespitose polycarpics whereas in Zvenigorod creeping ones.

This distribution in range of life-forms is typical for this zone.

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7. ENERGY-SAVING, ENVIRONMENTALLY FRIENDLY CHEMICAL AND TECHNOLOGICAL PROCESSES

Basamykina A.N. [1]***, Khorisov M.I.*** [2]

SPECIALITY OF WASTEWATER TREATMENT BY USING MEMBRANE BIOREACTORS (MBR) (REVIEW)

Russia
[1]*Bachelor Student, Ecological Faculty*
alena.basamykina@gmail.com
[2]*Bachelor Student, Ecological Faculty*
m.a.r.s.e.l.96@mail.ru
RUDN University, Moscow

Abstract: This article deals with the recent developments of specialty features of wastewater treatment by membrane bioreactor. The new method is based on membrane filtration process, which allows to increase mixed liquor volatile suspended solids (activated sludge concentration in an aeration tank) and to minimize required installation space.

Key words: membrane bioreactor, wastewater treatment, membrane filtration, aeration tank, activated sludge.

Introduction

Membrane bioreactor implementation to the existing facilities of sewer equipment, industrial plants is one of the most promising technological solutions, which provides high quality purified water. It corresponds to the most stringent regulatory requirements.

A possibility activated sludge biochemical degradation (biological treatment stage) is the basis for the application of MBR technology for cleaning a variety of industrial and municipal wastewater.

Methodology

The Membrane bioreactor is a combination of traditional biological treatment and a membrane. The membranes pore size is 0.01-0.1 microns. It provides particularly complete suspended solids and a microorganism removal. An aerobic process is

traditionally used for domestic wastewater treatment, however, an aerobic MBR is used for industrial wastewater treatment [1]

There are two types of membrane process implementation: pressure filtration (wastewater from the bioreactor feeds membrane module by pump, where it is separated into a filtrate and a concentrate with an activated sludge) and submerged membrane modules, which are located directly in the bioreactor (traditionally in the aerobic treatment zone).

The process moving force is a pressure difference, which is normally achieved by evacuation on the side of filtrate. The pressure drop is 0.2-0.5 bar, which theoretically allows submerged modules to be performed by gravity without pumping equipment. [2]

Obviously, membranes are the most sensitive unit in the system versus conventional technology. There are factors that have the greatest impact on their performance.

1. Membrane material. The material decision depends on pollution resistance in the treated wastewater (particularly, polysaccharides and proteins) and chemical stability during the membrane modules chemical sluicing. The membrane surface may be subjected to chemical modification. A screenings layer reduces the membrane material impact to the further fouling factor. Membrane property to recover permeability after a chemical or hydraulic flushing is also important.

2. The membrane pore size is not important: micro filter (pore size is 0.1-1 microns) and ultrafilter (pore size is 0.01-0.1 microns) demonstrate almost the same efficiency in suspended solids and microorganisms removing. Decreasing the pore size improves membrane pollution resistance, while screenings layer is removed better from the surface by hydraulic sluices. If it is necessary to block the virus, it is preferred to use the membrane with pore size less than 0.1 microns.

3. Membrane permeability. A significant reduction of permeability should be avoided during operation and hydraulic and chemical flushing should be timely mannered. Pressure boost

on the membrane causes sludge squeezing and increases its resistance during operation.

4. Membrane aeration. Membrane module air consumption depends on the liquid volume around the membranes, their specific area and airflow rate.

5. The filtered liquid speed near the surface. The motion speed increase of surrounding fluid does not have a significant positive effect for submersible modules, whereas it can reduce sludge formation and increase productivity for pressure tube modules.

6. Hydraulic flushing is effective against sludge formation. MBR operation experience demonstrates that filtration repetitive arresting can reduce membranes blinding.

7. Nature and composition of the incoming water. Large number of biodegradable organic matter presence in waste effluent contributes to the more extracellular polymeric substances (polysaccharides, proteins) formation, which block the membranes. High sludge age can drop the membrane blinding by reducing the polysaccharides content in sludge. Mechanical pre-treatment is needed. [3]

In addition, it is necessary to consider the quality of wastewater treatment after MBR modules.

Table 1. Composition of incoming and purified effluents

№	Value	Incoming effluent	Purified effluent by MBR
1	BOD_5, mg/l	110-250	1,0-1,5
2	N(NO3), mg/l	0-1	1,5-2,0
3	N(NH4), mg/l	12-23	0,2-0,3
4	P(PO4), mg/l	3,0-6,0	<1,0
5	E-coli, u*10^{-9}/l	10-20	<0.2
6	Suspend material, mg/l	190-350	<0,5

Discussion.

Specialty wastewater treatment by MBR is necessary to compare advantages and disadvantages of this technology.

Table 2. MBR advantages and disadvantages

Advantages	Disadvantages
1. Clarification maximum effect; 2. COD and BOD_5 reduce; 3. Purified water disinfection without chemicals; 4. Low sensitivity to discharge fluctuation and quality of incoming water; 5. Minimum water residence time in solids disengaging zone; 6. Microorganisms total blocking in the bioreactor; 7. Significant smaller occupied space versus clarification tank.	1. High installation costs; 2. Fatal membrane blinding and related costs; 3. High maintenance costs (electricity and membranes changing); 4. More sophisticated monitoring and control system; 5. Difficulty in ensuring an sufficient aeration level at high activated sludge concentrations; 6. High membrane sensitivity/

Conclusion

To sum up, implementation of MBR technology to various production facilities and municipal treatment plants can lead to an increase in the quality of water treatment (including its re-use by manufactures).

Implementation of MBR technology to the existing treatment facilities will replace secondary settling and after-treatment by filters.

As a result, it will improve the water purification quality, optimize hydraulic loads at all treatment steps and reduce operating costs.

In addition, MBR can be an important tool for increasing wastewater treatment economic efficiency, as well as to improve the industrial production environmental safety.

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Dülge, Alperen

RENEWABLE ENERGY DEVELOPMENTS in the WORLD & TURKEY

Turkey
Environmental Engineering M.Sc.
Post-graduate student, Ecological Faculty
RUDN University, Moscow
alperendulge@hotmail.com

Abstract: Turkey has been examined as the country being an emerging market for various renewable energies. Current regional installed capacities of solar, wind, hydropower, geothermal and bioenergy sources have been examined.

Key words: renewables, installed capacity, Turkey

Introduction**.** Renewable energies are the future to meet more than 50% of global electricity generation. Knowing how much a region or a country is being investing on each renewable energy source is important because it can give an idea about

future policies of the country for energy production and even business. Energy production methods have brought two concerns:

• More energy production

• Impacts on nature like global warming or ecosystem changes.

This paper focuses on how renewable energy technology has been developed over the years. Turkey's 2023 vision is pretty difficult to achieve.

Methods**.** Technologic development, regional usage and upcoming opportunities of the following renewable energies have been examined

Results and Discussion.

Solar energy has great potential in Turkey because of geographic location. There is one solar concentrated power facility, located in Mersin since 2013 with a capacity of 5 MW. Compared to almost 182 GWp installed capacity in the World, Turkey's contribution with 58 MWp does not have any impact at all.

Wind energy. Most of wind farms are built in Western Turkey, on the islands or shores on Aegean Sea but there are still some regions in Anatolia with sufficient potential to invest on. Turkey's wind capacity has been developed in the last four years. The development is around 660 MW increase per year.

Hydropower has the highest installed capacity with a great difference and it holds more than 50% of entire renewable capacities in the World. It is the first renewable energy type invested and it has the highest capacity in the country. Turkey does not have long rivers but there are 313 dams and some under construction to provide such energy production.

Geothermal energy has gained importance in the last few years. Turkey's investment in geothermal energy has been improving significantly

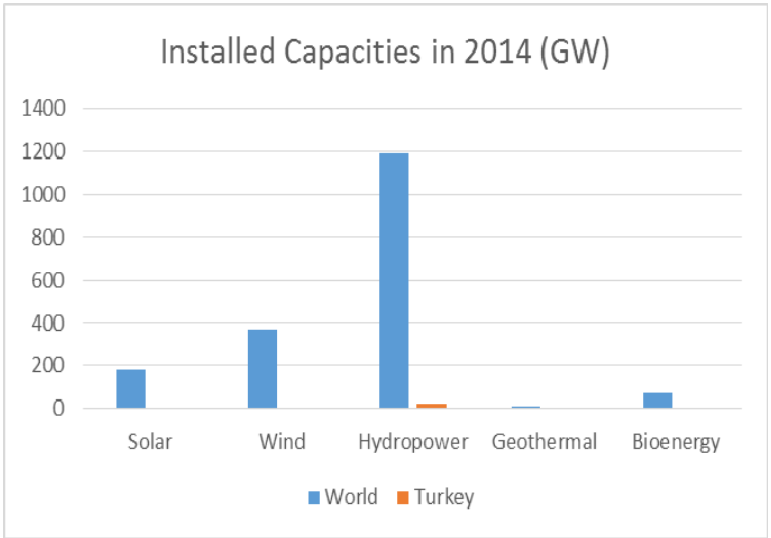

Figure 1. Total Installed Renewable Capacities in the World and Turkey in 2014 (GWe)

Turkey's bioenergy installed capacity is inefficient; waste and wastewater management went wrong. However, there is a significant increase after that year, 42 MW in 2012, 31 MW in 2013 and 32 MW in 2014 respectively.

Conclusions**.** Turkey has got great potentials for renewable energies but installed capacities are still in very low amounts. In addition, Turkey's future vision is not clear and not available for long term. All projections and aims are for 2023 vision, which is in eight years and this is not a long time period. Projections for 2030 and 2050 have to be developed and decided in order adapt to a sustainable future.

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Ershov V. A.

SYNTHESIS OF SILVER NANOPARTICLES AND STUDY OF THEIR PROPERTIES

Bachelor's student of the Department of Forensic Ecology with the course on Human Ecology, Ecological Faculty, RUDN University, Moscow

vadersh@yandex.ru

Abstract: Silver nanoparticles are widely used. Many properties of it are not studied. Uncontrolled use of silver nanoparticles may have harmful effect on the human health and on the environment.

Keywords: nanomaterials, nanoparticles, silver, synthesis.

The article is devoted to the synthesis of silver nanoparticles; it looks at their properties and the stability in water environment and in environment for microorganisms.

Nowadays nanomaterials find the application in many branches. One of the more widespread group of nanomaterials is silver nanoparticles of different forms and dimensions. In low concentrations silver nanoparticles are harmless for mammals and people, but are lethal for a large number of microorganisms and bacteria. Due to the bactericidal properties, silver nanoparticles are widely used. But uncontrolled use silver nanoparticles may have harmful effect on the human health and on the environment in general [1, p. 1].

Silver nanoparticles are used in the following sectors:

1) pharmaceutical industry (the treatment of dermatitis of infectious origin, the treatment of anemias, treatment of poisoning, treatment for a heart attack myocardium and more) [2, p. 2];
2) textile industry (production of sportswear and accessories) [3, p. 8];
3) cosmetic industry
4) food processing industry [4, p. 39]
5) wastewater treatment [5, p. 2]

6) the paint industry [6, p. 2] and many other applications.

During the experimental part the following practical tasks were achieved:

- mastered the chemical methods of preparation reagent's solution;
- used modern physical methods of analysis (optical spectroscopy, dynamic light scattering and other);
- developed a methodology of preparation of silver nanoparticles stable solutions using pulsed UV technology (initiating reduction of silver ions).

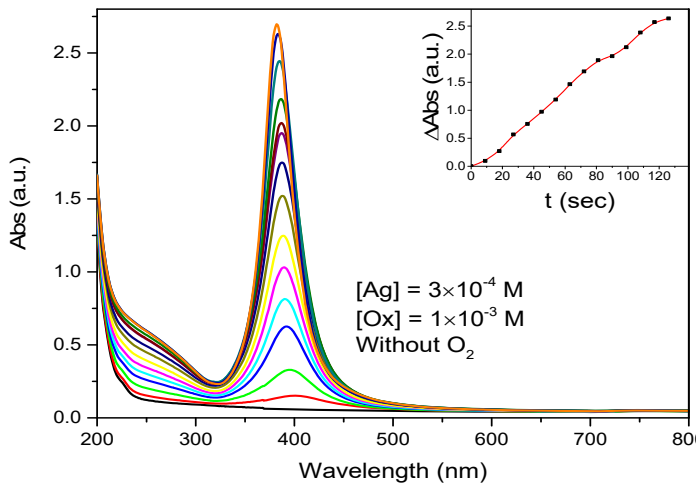

Figure 1. Synthesis of silver nanoparticles.

Fig 1. shows the reduction process of silver ions (Ag^+) and synthesis of nanoparticles.

Synthesis of silver nanoparticles was carried out by reduction of silver perchlorate ($AgClO_4$) in aqueous solution. The concentration of Ag^+ was 1×10^{-4} and 3×10^{-4}. As the reducing agent the potassium oxalate ($K_2C_2O_4$) was used. Its concentration was $3{,}1 \times 10^{-4}$ and 1×10^{-3} accordingly. The initiator of the

reduction process of silver ions were UV-light (pulsed UV lamp was used) with different time of irradiation. The reaction of silver reduction was carried out in a special cell, equipped with quartz Cuvee for the optical measurements. The volume of the test solutions was 2 ml. When tested the nanoparticles stability on water the volume was 3 ml (1.5 ml of colloidal solution + 1.5 ml of water), on the environment for microorganisms was 3 ml too (1.5 ml of colloidal solution + 1 ml of environment + 0.5 ml of water). The reaction was performed in the air and in vacuum.

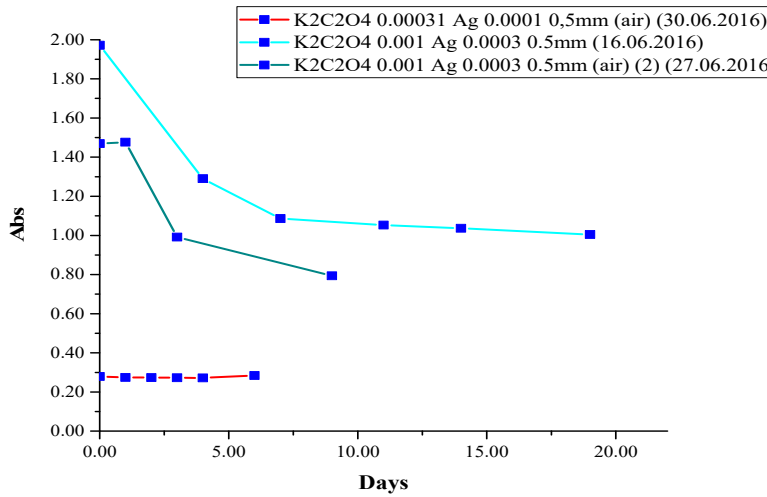

Figure 2. Stability of silver nanoparticles, initial solutions.

Analyzing this figure, we could say that silver nanoparticles are most stable when the initial concentrations are: potassium oxalate 1×10^{-3}, silver perchlorate 3×10^{-4}, provided that a colloidal solution is in a vacuum. When the irradiation is carried out on the air occurs the process of oxidation, electric double layer (EDL) becomes more fragile and the level of electrostatic protection reduce. As a result, nanoparticles enlarge or flocculate (group) and precipitate faster.

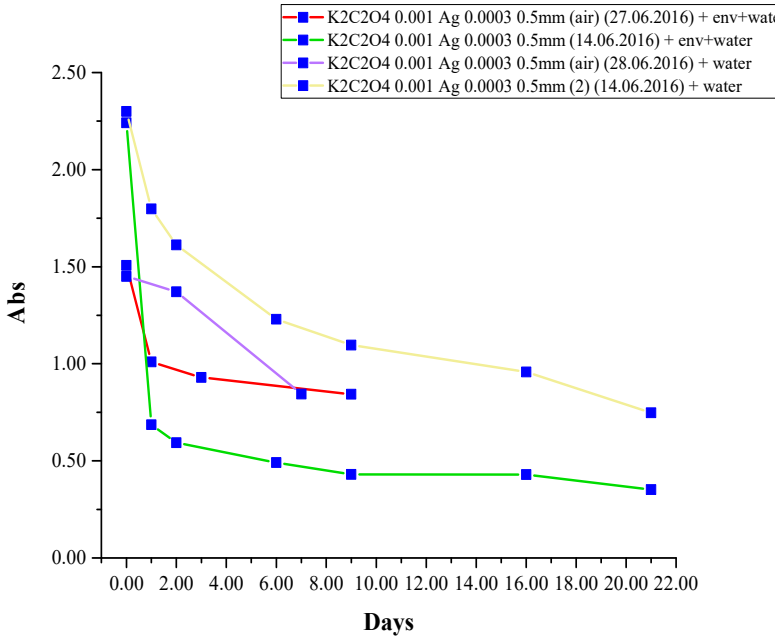

Figure 3. Stability of silver nanoparticles in water and environment for microorganisms.

Analyzing this figure we could say that silver nanoparticles are more sustainable on water. Silver nanoparticles are almost unstable on the environment for microorganisms.

As a result of work, we have got the nanoparticles with following parameters:

- Irradiation in vacuum. Diameter was 8-12 nanometres.
- Irradiation in air. Diameter was 20-25 nanometres.

To sum up, smaller silver nanoparticles result in the synthesis on vacuum, and are more stable on water solution.

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Kalinina M. O.

SOLAR ENERGY GENERATION: APPLICATION OF CLEAN TECHNOLOGIES IN AVIATION

Russia
Bachelor's student, Ecological faculty
RUDN University, Moscow
swan_000@list.ru

Abstract: Nowadays solar energy is a potential source of ecologically friendly energy generation. Clean technologies are projected to be used to modify modern branches of industry such as aviation.

Key words: solar energy, energy saving, solar aircraft, photocells, power engineering

Solar energy probably is the most powerful of all energy sources. During the year Earth gets about 1018 kWh of this ecologically friendly energy, 2 per cent of which is equivalent to the energy produced by burning of $2*10^{12}$ tons of conventional fuel [1]. This quantity can be easily checked against the world fuel economy and in prospect solar energy is apparently to become the main source of light and heat for human civilization. The current of solar radiation can be taken under control and used efficiently without changing Earth's unique climate.

However solar energy generation is still underdeveloped and the reason is that insolation current reaching the Earth's surface is of very low density. Thus solar energy should be collected on large areas by use of concentrators to intensify the solar energy pathways [1,4].

Concentrators include mirror or lens elements and solar heating units [1]. These structures are inexpensive and accident-free; though their disadvantages are connected with high cost of initial installation and inconstant production of energy as a result of unsteady luminance.

The functioning of solar batteries is based on abilities of the photocells to transform energy from one form into another. The

photocells utilize nature of some semiconductor materials such as silicon and cadmium telluride [1].

Nowadays solar energy is mostly spread in small-scale power generation, which produces energy for the dwelling-houses and small enterprises. Another sphere for solar energy application is transport engineering, especially aviation industry.

In 1970-s the interest of aircraft designers in the photocells was raised and the first results of elaborations were the unmanned drones running on solar energy [2].

The first unmanned aircraft operated on solar energy was Sunrise I of the American company Astro Flight which took its premiere flight in 1974 while Solar Riser is considered to be the pioneer of «solar» man-carrying aircraft undergone testing in 1979. In1981 a single-pilot aircraft Solar Challenger built by AeroVironment succeeded in flying over the English Channel. Challenger was equipped with 16 000 Photocells [2].

Millennium became the new era for unmanned drones. In 2001 AeroVironment by the order of NASA created Helios which was used in the program «Environmental Research Aircraft and Sensor Technology» (ERAST). This aircraft was worked out as an archetype for the high-flying drones which would be able to fly for a very prolonged period of time and accomplish a mission of environmental monitoring and in addition to operate as a radio relay during weeks or even months without fuel utilization or environmental contamination [2, 3].

During a definite period there were some doubts about possibility of solar aircraft to fly at night time. As a result their construction underwent a change – solar aircrafts got special accumulators [4, 5]. This reformation became essential for discovery of the new capabilities. Owing to energy accumulated in the batteries the aircraft is able to go aloft even at night when photocells don’t function. If the amount of energy is sufficient for keeping aerial vehicle in the air theoretically all limits for airborne time can be removed.

The possibility of night-time flight was proved by Solar Impulse (HB-SIA) in 2010 when the remaining balance of the accumulator charge equaled about 40 per cent after 26-hours long flight [2]. And in 2016 Solar Impulse 2 (SI2), which possesses upgraded accumulators has revealed that «solar» aircrafts are able to accomplish the transoceanic flight.

All of these inventions vividly demonstrate the potential function of renewable energy sources and opportunities of solar aircraft and the development of ecologically clean technologies on the whole. However without appropriate breakthrough in the spheres of science and solar energy engineering the expansion of solar energy use will be problematic. Thus the problem consists in how to persuade humanity that the technological progress can follow a new energy direction. It is necessary to reveal that nowadays the available clean technologies provide us the advantages of decreasing the dependence on fossil fuels [2, 5].

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Khizriev.A.S,

ENVIRONMENTAL BASIS OF USE OF RENEWABLE ENERGY SOURCES AS A COMPONENT OF SUSTAINABLE DEVELOPMENT OF THE REPUBLIC OF DAGESTAN

Russia, the Republic of Dagestan
Master's student, Ecological Faculty,
RUDN University
Alikhan-1995@mail.ru

Abstract: In the article the ecological - economic development of the renewable energy sources is analyzed and factors impeding the expansion of the development scale are identified. Prospects and directions of development of renewable energy sources and their role in the energy future of the Republic of Dagestan are determined..

Key words: Power management, the use of renewable energy, sustainability, efficiency, energy conservation, ecosystem changes.

Using renewable energy is an important problem of modern energy development. Hydro power plants play a decisive role in electric power systems, providing covering of load peaks graphs and performing backup functions. Power plants based on new unconventional renewable resources (solar, wind, geothermal, biomass, ocean energy) become now of great importance, as fossil fuels are preserved, electricity is provided to remote and inaccessible areas of the country, natural resources are used rationally. Evaluation of the efficiency of power plants based on renewable energy sources should be carried out with the simultaneous analysis of their impact on the environment and

identifying the best ways of use and protection of natural resources.

Energy from renewable sources uses energy flows, existing in the surrounding area. Consequently, the heat pollution of the environment caused by dumping in it a certain part of the converted energy is negligible. For this reason, other minor air and water pollution and waste volumes are insignificant. It is believed that the generation of electricity from renewable sources is a completely environmentally "clean" option. This is not entirely true, since these sources of energy have a fundamentally different spectrum of effects on the environment compared to conventional power plants using organic, mineral and hydraulic fuel, and in some cases the impact of the latter is even less dangerous. Moreover, certain types of environmental impact of renewable energy sources on the environment, are not clear up to present, particularly in terms of time, and therefore have been developed and studied to a lesser extent than the technical issues of using these sources.

One of the renewable energy sources is hydropower resources, which have long been attributed to environmentally "clean" energy sources. Not taking into consideration the environmental consequences of such use, the development of environmental activities was carried out insufficiently, which led to the justified criticism of hydropower construction. This cannot be allowed in respect of non-conventional renewable sources. Their potential environmental impact should be discussed in advance and openly, with community involvement.

The main factors of environmental impact of renewable energy on a variety of natural environments and objects are considered.

1.3. The hydropower.

1.3. The impact assessed while designing.

1.1.1. Flooding and waterlogging.

1.3. Shore erosion and soil erosion.

1.3. The elimination of mineral deposits.

1.3. Modification of the hydrological, hydro and ice-thermal, hydrochemical and hydrobiological regimes.

1.3. Climate change, landscape change.

1.3. Changing the terrestrial and aquatic flora and fauna.

1.3. Tectonic changes (increase in seismicity).

1.3. Impacts during construction.

1.2.1. Acoustic pollution.

1.2.2. Air pollution caused by work of construction equipment.

1.2.3. Turbid water, oil discharges into waters.

1.2.4. Buildings and outbuildings, warehouses and communications.

1.2.5. Construction and household waste, volley discharges and emissions of pollutants, peak construction impacts.

1.2.6. Violation of the soil and vegetation.

1.2.7. Complex effects on flora and fauna.

1.3. Impacts during operation.

1.3.1. Drainage of flood plains, winter flooding of land, and climate change icethermal downstream.

1.3.2. Thermal, mechanical (sediment formation), chemical pollution of water reservoirs.

1.3.3. Biological, organic (natural and artificial), biogenic, bacterial contamination.

1.3.4. Pesticides and oil pollution.

1.3.5. Emergency impact on all media.

2. By using solar energy.

2.1. The alienation of lands, their possible degradation.

2.2. Most of the consumption of materials.

2.3. The possibility of leakage of operating fluids containing chlorates and nitrites.

2.4. Risk of overheating and burning of systems, contamination of products with toxic substances when using solar systems in agriculture.

2.5. Changing the heat balance, humidity, wind direction in the vicinity of the station location.

2.6. Blackout large areas of solar concentrators, the possible degradation of the land.

2.7. Impact on the climate space SES.

2.8. Interference with television and radio.

2.9. The transfer of energy to the Earth in the form of microwave radiation, harmful to living organisms and humans.

3. Bioenergy.

3.1. Particulate emissions, carcinogenic and toxic substances, carbon monoxide, biogas biospirit.

3.2. Generation of heat, the heat balance change.

3.3. Depletion of soil organic matter, soil depletion and erosion.

3.4. Explosiveness.

3.5. A large amount of waste in the form of byproducts (water washing, distillation residues).

4. Geothermal energy.

4.1. land alienation.

4.2. Changes in the level of groundwater, land subsidence, waterlogging.

4.3. The movements of the crust, increased seismic activity.

4.4. Gases (methane, hydrogen, nitrogen, ammonia, hydrogen sulphide).

4.5. The release of heat into the atmosphere or into surface water.

4.6. Dumping of poisoned water and water condensate contaminated with small amounts of ammonia, mercury and silica.

4.7. Contamination of groundwater and aquifers, soil salinisation.

4.8. Emissions of large quantities of brine in case of pipeline rupture.

5. The wind energy

5.1. Noise impacts, electrical appliances, radio and television interference.

5.2. Alienation of land.

5.3. Local climate change.

5.4. The danger to migratory birds and insects.

5.5. Physical incompatibility, unattractiveness, visual non-perception, unease.

5.6. Changing the traditional sea shipping, adverse effects on marine animals.

Currently, the negative impact of renewable energy sources in view of the small scale of their use and low power of stations appears to be slight. In the near future with an increase in their share in the total energy balance negative environmental factors should be taken into account in the design and operation of these facilities.

To select in the region the optimal technologies while creating and using renewable energy environmental impact assessment must be carried out with a systematic analysis of positions, taking into account the whole complex of various factors: exclusion of areas; effect of surrounding areas on the biological process; impact on flora and fauna; release of new mineral resources and raw materials; additional medical-biological and sanitary problems, etc. It is necessary to create a scientifically based methodology for quantifying the interaction of various factors of non-traditional renewable sources of energy with the environment on the basis of natural or economic indicators.

Thus, the transition to sustainable development in the Republic of Dagestan and the analysis of non-traditional renewable energy sources with the aim of their long-term use as an alternative to traditional power plants is impossible without taking into account the ecosystem changes and the estimation of anthropogenic influence.

At the first stage of substantiating materials and project development preliminary assessment of the environmental effects can be produced on the basis of generalized units (referred to 1 kW) impact indicators of unconventional energy sources in different areas of the environment (land, soil, water, atmosphere,

forests, etc.). For this purpose, the factors of adverse environmental impact of power plants based on renewable energy sources are specified and recommendations on methods of research, evaluation and definition of quantitative indicators are provided.

To apply the considered approach, bio-energy equivalents for the various types of measures to eliminate the (compensation) adverse environmental impacts of various kinds should be known. In this case, the condition of the environmental compatibility of alternative power will be executed without the use of economic assessments of certain types of damage. Unfortunately, there is currently no equivalent of bioenergy for certain types of conservation and environment protection measures.

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Khudynina V.S

Bewertung von Verfahren der Verarbeitung von Kohlenwasserstoffabfällen

Ökologisch Fakultät
Russische Universität der Völkerfreundschaft
49183@mail.ru

Annotation: The article reviewed the physical, physic-chemical, chemical and biochemical methods of sludge processing. The main advantages and disadvantages of the methods have been identified.

Key words: Decontamination, equipment, methods, oil sludge, processing, oil

Zusammenfassung: Der Artikel überprüft physikalische, physikalisch-chemische, chemische und biochemische Methoden der Schlammbehandlung. Die wichtigsten Vorteile und Nachteile der Verfahren wurden identifiziert.

Stichwörter: Öl, Energiequellen, Methan, Ölschlamm, energiesparende Technologie

Die Verarbeitung von Ölabfällen ist einer der führenden modernen russischen Ölindustrie. Eine große Anzahl von Geschäften hat einen negativen Einfluss auf die Umwelt. Somit ist die erste Priorität, die Bildung von Ölabfällen durch Recycling zu verringern.

Relevanz des Themas aufgrund der aktuellen Politik des Staates „Suche nach möglichen Mitteln und Wege zur Entsorgung von Abfällen und die Entwicklung neuer umweltverträglichen und wirtschaftlich machbaren Systeme der Vorbereitung von Warenrohstoffe“. Es gibt physikalische, physikalisch-chemische, chemische und biochemische Verfahren der Schlammrückführung .

Physikalische Methoden der Verarbeitung und Verwertung von Kohlenwasserstoffabfällen wurden auf die hydromechanischen Prozesse gegründet. Die Grundlage der hydromechanischen Prozesse ist hydrostatische und hydromechanische Wirkung auf die behandelten Materialien. Solche Prozesse umfassen Rühren, Sedimentation, Filtration, Zentrifugieren. Die treibende Kraft ist der hydrostatische Druck oder Zentrifugalkraft. Die obere Ölschicht des Schlamms, die von 2 bis 5% Wasser und 1% Feststoffen enthält, wird zur Verarbeitung zusammen mit dem Rohöl gepumpt. Sedimentationsverfahren löst das Problem der Entsorgung der durchschnittlichen "Emulsion" und des Bodens "schwere" Teile des Schlamms nicht.

Die Filtration wird durch Schlammfilterpressen, Vakuum-Filter und mit dem Zusatz von Koagulantien durchgeführt: Kalk und Eisenchlorid und Flockungsmittel. Filtrierung ist ein langer und teurer Prozess, der nach der Verwendung von großen

Flächen, Behältern und große Mengen an Reagenzien fordert. Es entsteht auch der Bedarf zum Ändern und Regenerieren des Filtermaterials.

Zentrifugieren ist ein Verfahren zur Trennung von Ölschlammreinigung. Für diese Zwecke werden Dekanter oft verwendet. Dekanter ist eine horizontale Zentrifuge mit kontinuierlichen Schneckenaustragung. Die Trennung von Schlamm geschieht durch die Zentrifugalkraft nach Bestandfraktionen. Um die Trennleistung zu verbessern, wird zuvor der Ölschlamm mit einem chemischen Reagenz behandelt. Der entwässerte Schlamm wird zum Verbrennen oder zur Beerdigung geliefert und Ölabscheider werden durch die zweite Stufe rein gemacht und dann auf eine Standardverarbeitung gesendet.

Physikochemische Methoden sind vor allem nicht nur für die Verarbeitung und Entsorgung verwendet, sondern zur Beseitigung von Kohlenwasserstoff-Abfällen. Umweltbedingungen haben einen erheblichen Einfluss auf die Veränderung der Eigenschaften des Systems bei dem Verlaufen von physikalischen und chemischen Prozessen, in denen sie umgesetzt werden. Oberflächen- und Grenzflächeneigenschaften verändern sich und andere Phänomene des gemischten Charakters können sich entwickeln.

Extraktion – ist der Prozess der Trennung von festen und flüssigen Gemischen durch selektive Auflösung von einer oder mehreren Komponenten in der Flüssigkeit. In großem Maßstab wird sie in der Raffinerieindustrie eingesetzt.

Die Nachteile dieses Verfahrens sind: Energieverwendbarkeit und die Verwendung von Fremdstoffen (Extrahieren). Der Einsatz von Extrahieren führt zur unvermeidlichen Verschmutzung des geteilten Produkts, die Reinigung dessen mit hohen Kosten verbunden ist.

Die Vorteile des Verfahrens ist der hohe Grad der Reinigung und Trennung von Schlamm.

Chemische Methoden der Sanierung von flüssigen und harten wasserstoffhaltemden Abfällen bestehen in der Zugabe von Chemikalien zu der neutralisierten Vielzahl. Chemische Reaktionstyp wird durch das Verfahren bestimmt: Fällung, Oxidation-Reduktion, Substitution, Chelat. Abscheidungsverfahren auf Basis ionischer Reaktionen mit der Bildung von schlecht wasserlöslichen Substanzen, fallen als Niederschläge.

Verfahren zur Abscheidung von organischen Schadstoffen basiert sich auf zwei Arten von Reaktionen: Chelatbildung und Kristallisation. Für Chelatbildung oder chemische Immobilisierung gebraucht man Zement, Asche, Natrium- und Kaliumsilikate, Kalk und Geliermittel. Eine der gebräuchlichsten chemischen Reagenzien, die in dem Verfahren der Schlammentsorgung Praxis verwendet wird, ist Calciumoxid oder Branntkalk. Die häufigste Methode der chemischen Dekontamination ist Kalkbehandlung von Abfall in einer Menge von 5-50 %. Das hydrophobe Pulver wird nach dem Trocknen von 2-20 Tagen unter natürlichen Bedingungen erhalten, das als Baumaterial in den Bau von Straßen verwendet wird.

Einwirkung auf Ölschlamm mit Chemikalien führt zu einem deutlichen Anstieg der endgültigen Kosten.

Es scheint also, chemische Verfahren zur Verarbeitung von Schlamm am besten für den Boden des Schlammlagertanks geeignet zu haben. Dadurch wird die Verschmutzung von Grundwasser verhindert.

Biochemische Prozesse sind als chemische Umwandlungen dargestellt. Daran nehmen die Lebewesen aktiv teil, die als biologische Katalysatoren wirken. Biochemische kohlenwasserstoffhaltige Abfallverarbeitung basiert sich auf der Fähigkeit bestimmter Mikroorganismen, aliphatische und aromatische Kohlenwasserstoffe in unschädliche Kohlendioxid und Wasser umzuwandeln.

Biochemische Verfahren charakterisieren sich durch geringe Kosten.

Die Nachteile sind die Langwierigkeit des Prozesses, spezielle Ausrüstung und große Fläche. Es lohnt sich zu erwähnen, dass die Entsorgung von Ölschlamm und Reinigung von ölverschmutzten Böden mit mikrobiellen Öl Destruktoren Verwendung schwierig ist und durch die Wirksamkeit der Prozesse nicht eindeutig ist

Auf solche Weise haben die bisher herkömmlichen Technologien der Schlammbehandlung eine geringe Produktivität und Selektivität. Sie sind nur auf einer bestimmten Fraktion oder die Zusammensetzung des Schlamms angeeignet. Die Verfahren der Verarbeitung von Ölschlamm einen weiten Bereich, wie beispielsweise thermische Desorption oder dekantes Verfahren sind kompliziert und teuer. Alle vorgeschlagenen Verfahren weisen die Beschränkungen auf die Zusammensetzung der Rohschlamm auf. Sie werden streng durch die Viskosität des Öls, der Wassergehalt und der mechanischen Verunreinigungen reguliert. Im Fall der Änderungen von Schlammzusammensetzung können zusätzliche kostspielige Änderungen in der Ausrüstung erforderlich sein.

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Kruglova L.E.

ENSURING TECHNOSPHERE SAFETY IN THE DESIGN AND IMPLEMENTATION OF A SYSTEM OF PETROLEUM PRODUCTS OF THE OIL INDUSTRY

Russia
Master's student
RUDN UniversityEcological Faculty
samarina_lolita@mail.ru

Abstract: In this paper, we consider the problem of air pollution by enterprises of oil industry the case ctydy of Ulyanovsk plant tank farm JSC "Ul'yanovsknefteprodukt". We considered the emissions of polluting substances in atmospheric air as a factor of negative impact on the environment.

Key words: hydrocarbons, oil, pollution, atmosphere, air

Introduction**.** Currently, the oil sector of the fuel and energy complex of Russia is one of the most stable and developed. Every year according to various estimates 50-90 million tons of hydrocarbons are released into the planet's atmosphere.

The selected topic is relevant, since the fuel and energy complex of Russia is one of the main sources of environmental pollution. In addition to the pollution of the atmosphere, evaporation of hydrocarbons causes another problem – the losses for the company due to losses of raw materials.

The objective of this paper is the development of measures to reduce the negative impact of petroliferous emissions of oil and gas companies on the environment and reduce losses of hydrocarbon crudes.

The object of research is the existing Russian system of environmental protection from negative impact of emissions.

The subject of design is a system of vapor recovery of hydrocarbons, proposed for construction at the company supply the city of Ulyanovsk, with the aim of reducing the harmful effects of emissions on the environment.

"The oil industry is a source of environmental pollution". Emissions are generated at all steps of the pricess from extraction of hydrocarbons to delivery of finished materials. "Principal sources of emissions constitute such processes as production, processing, storage, transportation of hydrocarbons, and sales of products" [5, p. 96].

"Polluting substances in atmospheric air from light fractions of oil, such as gasoline, are such toxic substances as benzene, xylene, toluene" [4, p. 287]. Their impact on the human body is represented by toxic effects primarily.

Measures for reducing emissions aimed at addressing losses in storage, transportation, receiving and issuing, as well as to improve control of sealing equipment and the observance of technological regimes. The most common are: gas catching, condensing and absorption system.

For the introduction of vapor recovery systems oil I will consider the cars of Ulyanovsk plant of oil depot of ZAO Ulyanovsknefteproduct" in the city of Ulyanovsk.

"The company emissions are generated due to: storage of petroleum products (emissions from operation of tanks); distribution of petroleum products in road tankers (emissions from operation of the automated loading station); when refueling automotive fuels (emissions from the operation of the filling station)" [3, p. 33].

The calculation of the amount of pollutant emissions into the atmospheric air were made of the calculated and instrumental methods. "Settlement was made according to the "methodology for rating and determining the emissions of harmful substances into the atmosphere" [2, p. 25].

From the obtained results of calculation, it can be concluded that the largest contribution to air pollution refers to the maintenance tank and there is excess of maximum permissible emissions. Therefore requires the implementation of complex vapor recovery process of the tank farm.

For the petrol station absorption system was selected for collection and recuperation of gasoline vapors. The operation is based on the principle of absorption – the absorption of hydrocarbons, liquid absorbent, in particular, diesel fuel. «The degree of purification is 95%» [1, p. 70]. For the tank farm gas equalizing system was selected. It is a system of piping for air-steam mixture connecting the tanks tanks-tanks. Automated loading station was chosen as the complex condensation and dispersion of vapors of oil and petroleum products.

At the same time on the basis of up to 20 000 tons of petroleum products, so it is characterized by high energy potential and is a dangerous industrial object. This confirms the need for reconstruction of the tank farm.

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Markov E.O.

TIRES RECYCLING FACILITY

Bachelor's Student, Ecological Faculty
RUDN University, Moscow
Johny-26@mail.com

Abstract: This article deals with different kinds of tire recycling. New modern methods such as Ambient mechanical grinding and Cryogenic grinding allow to decrease harm environment influence.

Key words: tire recycling, economical efficiency, multi-step technology, secondary use.

Introduction

The dynamic growth of the vehicle fleet in all developed countries leads to a constant accumulation of tires. As a result, the worn tires are a source of long-term pollution.

Stockpiled tires are a convenient place to stay for the colonies of rodents and insects, which are carriers of infectious diseases. Besides tires flammable and are not biodegradable. The problem of storing tires is struggling in several ways, the most common of which is recycling.

Tire Recycling is also preferred because 80% of the world's supply of tires made out of synthetic rubber, which is obtained from oil - a non-renewable natural resource. Replacing the storage, dumping and incineration disposal technology has significant economic value, as it promotes the conservation of natural reserves of valuable raw materials, stimulates the development of resource-saving, low-cost technologies, and also improves the environment and eliminates the loss of large areas of land for landfill waste rubber.

Tire recycles methods

Ambient Mechanical Grinding

In ambient mechanical grinding process, the breaking up of a scrap tire happens at or above normal room temperature. Ambient grinding is a multi-step technology and uses whole or

pre-treated car or truck tires in the form of shred or chips, or sidewalls or treads. The rubbers, metals and textiles are sequentially separated out. Tires are passed through a shredder, which breaks the tires into chips.

The chips are fed into a granulator that breaks them into small pieces while removing steel and fiber in the process. Any remaining steel is removed magnetically and fiber through a combination of shaking screens and wind sifters. Finer rubber particles can be obtained through further grinding in secondary granulators and high-speed rotary mills.

Cryogenic Grinding

Cryogenic grinding refers to the grinding of scrap tires at temperatures near minus 80ºC using liquid nitrogen or commercial refrigerants. Cryogenic processing generally uses pre-treated car or truck tires as feedstock, most often in the form of chips or ambiently produced granulate.

Processing takes place at very low temperature using liquid nitrogen or commercial refrigerants to embrittle the rubber. It can be a four-phase system which includes initial size reduction, cooling, separation, and milling. The material enters a freezing chamber where liquid nitrogen is used to cool it from –80 to –120 °C, below the point where rubber ceases to behave as a flexible material and can be easily crushed and broken.

Because of its brittle state, fibres and metal are easily separated out in a hammer mill. The granulate then passes through a series of magnetic screens and sifting stations to remove the last vestiges of impurities. This process requires less energy than others and produces rubber crumb of much finer quality.

Applications of Crumb Rubber

Both ambient and cryogenic processing can be repeated to produce finer particles. Increasingly, the two with their attendant technologies, are combined into one continuous system in order to benefit from the advantages and characteristics of each and to reduce overall costs.

The ambient system is generally used for the initial size reduction phases. The cryogenic system is used to further reduce the material in size and then to remove the metals and textiles. The outputs from either or both systems can be used directly or as feedstock for further processing.

Rubber crumb is sold as feedstock for chemical devulcanization or pyrolysis processes, added to asphalt for highway paving and pavement sealers, or used for the production of a large number of recycled rubber-containing products. Some of the major applications of crumb rubber are as follows:

Sport Surfaces

- School sports areas
- Athletic tracks
- Tennis and Basketball courts

Automotive Industry

- Bumpers
- SplashGuardsandFenders
- Floor Mats for Cars and Trucks

Construction

- Hospital Industrial and BathroomFlooring
- Floor Tile
- Foundation Waterproofing

Geotechnical/Asphalt Applications

- Rubberized Asphalt for Roads and Driveways
- Drainage Pipes
- Soil Conditioner
- Porous Irrigation Pipes
- Road Building and Repair

Adhesives and Sealants:

- Adhesivesand Sealing Compounds
- Textured and Non-Slip Paints
- Roof Coating and Waterproofing

Shock Absorption and Safety Products

- Shock Absorbing Pads for Rails and Machinery
- Sound Barriers for Highways

- Abrasion Liningin Mining Equipment

Rubber and Plastic Products

- Pipe Insulation and Lining
- Shoe Soles and Heels
- Wireand Cable Insulation

Conclusion

Unfortunately, the industry for the processing of tires in Russia is not interesting in terms of financial investments and equipment which needed for their processing is quite expensive. The total amount of recycled tires in Russia is about 20% of the total. In this connection there is a process of accumulation and, as a result, causing irreparable damage to the environment. For comparison, the level of processing of the worn tires in Europe is 76%, in US - 87%, and in Japan - 89%.

Modern industry should be focused not only on the extraction and production of natural resources, but also on environmental preservation. Recycling is currently the most effective way to improve the environment.

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Mikhailova V.A.

USE OF ENERGY CULTURES AND THEIR TYPES

Master's student, Ecological Faculty,
RUDN University
Varie93@mail.ru

Abstract: The existing types of energy cultures and their main characteristics are considered.

Keywords: energy cultures, biomass, renewable energy resources.

Reserves of the main sources of energy, such as oil, gas, coal, are reduced every year and their prices are constantly growing. Fortunately, there are also other power sources – alternative or renewable energy resources. Recently the huge attention has been paid to them. Solar, wind, tidal, geothermal energies belong to alternative energy sources, and also it is possible to grow up energy cultures (biomass). Energy cultures are plants which are specially grown up for energy needs. In Europe interest in energy cultures arose in the 1970s years in connection with the unexpected energy crisis. Now cultivation of energy cultures remains the topical issue for the whole world.

According to the cultivation cycle energy cultures are divided into monocycle crops (colza, sunflower) and permanent crops, and according to the type-into grassy (miscanthus) and treelike plants (willow, poplar).

One-year herbs (sorghum, kenaf, etc.) can be easily integrated into a regular agricultural crop rotation. From the point of view of cultivation and gathering they are close to traditional crops. Depending on the area and conditions of cultivation the crop capacity is about 70... 140 t per hectare, or 20... 49 t of dry weight/hectare (if it is not about the "fresh" biomass, i.e. humidity about 50%). The plant easily adapts to various soil and weather conditions, the greatest productivity is observed in the countries of Southern Europe, for example, in Greece.

Long-term herbs (miscanthus, switch grass, lady's-laces, etc.) significantly differ from regular crops. Their crop rotation constitutes 10... 15 years, they practically don't require preparation of the soil, and further handling doesn't require big costs. The crop is reaped annually by using regular agricultural machinery. When using the correct technology of sowing and care the long-term grass can improve the condition of the depleted soil. Deep roots strengthen structure of the soil, increase content of organic substances in it and serve as some kind of filters for ground waters. The lack of annual plowing also exerts a positive impact on the soil (for example, the erosion decreases).

The typical representative of long-term herbs is a miscanthus – a treelike grass with a powerful root system (to 2,5 m in depth), from Asia by origin. After sowing the grass can be gathered annually for about 15 years. By the third year the yield reaches 10... 16 t of dry weight per hectare. Rapid growth in especially hot summer and frost resistance are characteristic of the culture. The heat-producing value of a miscanthus is 17 MDzh/kg (of dry weight), the content of ashes is 2,7%. The researches conducted in Greece have shown that in favorable climatic conditions (not very dry summer), productivity can reach 28... 30 t of dry weight per hectare. The best results have been received at the density of sowing of 10 thousand and more saplings per hectare and when applying a nitrogen fertilizer in amount of 50 kg per hectare [1].

Plantations of fast-growing trees and treelike plants (willow, poplar, acacia, etc.) also significantly differ from traditional agricultural or forest sowing. Such plants are planted for approximately 10... 15 years and are reaped every 2... 5 years. The density of sowing is very high, up to 25 thousand saplings per hectare (on average about 10 thousand/hectare) [2].

Productivity of energy cultures directly depends on climatic, soil and other conditions. Cultures have various need for the water mode, have different freezing tolerance and drought resistances (Table 1). Cultivation of all energy cultures can be

divided conditionally into 3 stages: 1) preparation of the soil; 2) immediate cultivation (sowing, care for a plantation); 3) harvesting (the final transaction is liquidation of a plantation after the ending of the term of its existence). Depending on a type of energy culture the process of cultivation has its own characteristics. So, for example, a miscanthus is planted by rhizomes, while a poplar and a willow are by using saplings [3].

Table 1. Characteristics of energy cultures in relation to cultivation conditions [4].

Energy culture	Temperature, °C			water demand	freezing tolerance	drought resistance
	seed germinative capacity	Growth of the culture				
		min	max			
Monocyclic culture						
Colza	>5	5	30	medium	high	medium
Sunflower	10	5	35	medium	low	medium
Flax	7-9	8	30	medium	medium	medium
Sorghum	12	10	40	medium	low	high
Fast-growing treelike cultures						
Willow	-	0	30	high	high	low
Poplar	-	0	30	medium	medium	medium
Eucalyptus	-	5	35	high	low	high
Permanent grass cultures						
lady's-laces				high	high	low
Switch grass				medium	high	medium/ high
Miscanthus				medium/ high	medium	low

Energy cultures are the sources of hope at the energy market as being related to renewable energy resources. They can

produce heat, electric power and fuel. Cultivation of energy cultures prevents soil erosion, and also promotes environmental improvement. Further we plan to study the assessment of efficiency of using such crops in biofuel production in Russia and in the world.

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Rios V.N.[1]

THE INVESTIGATIONS OF CONDITIONS OF STABILIZATION OF PETROTHERMAL STATION FUNCTIONING

Russia
[1]*Master's student, Ecological Faculty*
fotieva94@mail.com

Abstract: The petrothermal resource use. Key features of petrothermal station. The advantages and disadvantages of petrothermal energy. The investigations of conditions of stabilization of functioning petrothermal station and their results.

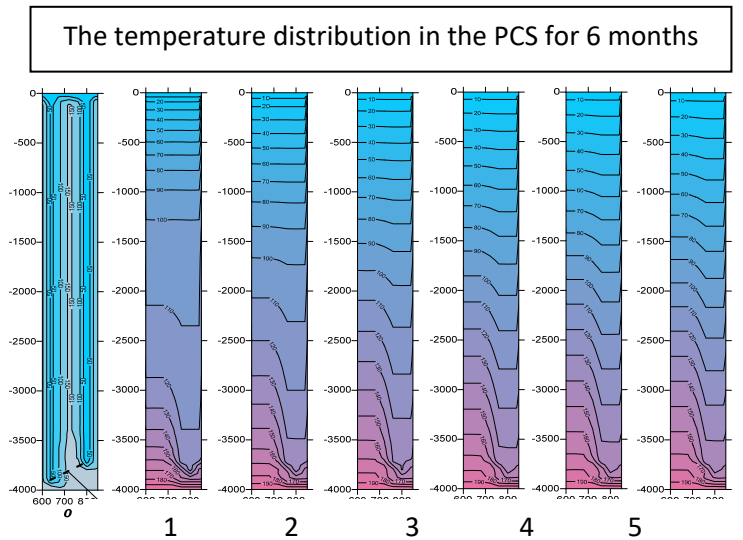
Key words: petrothermal energy, petrothermal station, PCS, deep well

The interest in alternative energy sources, which has increased during recent decades, is caused by both the exhaustion of hydrocarbons and by the necessity of addressing environmental issues. [1] The heat of the Earth's depths is one of the inexhaustible energy sources and the research, which we have conducted, contributes to the development of the alternative energy.

Russia has rich fuel resources, but intensive extraction of nonrenewable natural energy resources is still increasing. Fortunately, the analysis shows that Russia is also rich in geothermal resources, because of its great area: geothermal resources of Russia are almost 10 times bigger than fuel. [2]. But for obvious reasons, we don´t have enough experience in industrial exploration of this type of resource. This factor, as well as the requirement to drill several deep wells, is the main disadvantage in this area. The advantages of the power source are inexhaustibility, small amounts of waste, proximity to consumers and relative ecologic cleanness. [3]. A PCS for the extraction of underground heat consists of the following principal elements: an injector well; an underground «heat cauldron»; and a production well, through which fluid is transported to the surface. In

addition, the system should include a turbine room, cooling towers, condensers, intermediate heat exchange installations, pipelines, and, if possible, installations for the extraction of useful chemical elements from the pumped water, which is then pumped into the pressure well again.

The aim of the research was to investigate the conditions of stabilization of functioning petrothermal station. In order to do that, we have created a model of the station on the set parameters in the special software package «TERMGRAF» and made a series of economic calculations. This information is relevant to process engineers, who can use it to calculate the test power plant project and for investors to determine the payback period of the project.



1. Pic. The temperature distribution in the PCS for 6 months

In our work, we have chosen a station that has 2 wells with a depth of 4 kilometers. In addition there is artificial thermal collector and the water temperature at the inlet of the injector well - 10°C.

The result shows that our station starts to operate in the steady state after 4 months after start. At this point, the water temperature at the bottom of the production well will be 180 ° C. With the temperature indicator of the thermal energy conversion into electricity is possible only in the binary cycle power station. [4].

The next step was the calculation of some of the technical and economic indicators of the petrothermal station. The result showed that the minimum investment in the project will amount to 1.994 billiones rubles, the installed capacity of the station that operates on a binary cycle, will be 10 MW and electricity generation in the year will be 50 billion KWh. Life of the plant is approximately 30 years, and throughout this time period, a town with a population of about 10 thousand people will be able to get cheap electricity -. 60 kopecks. per kW / h.

From this we can draw the following conclusions: even relatively small petrothermal stations (of the discussed in this paper tipe) would solve a number of strategic energy issues. Especially in regions where power supply is insufficient. And speaking of the larger projects, and petrothermal energy in general, is safe to say, that development of petrothermal energy will make a great contribution to the energy and economic security of the state, and will help to solve a number of environmental problems.

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Rozhdestvenskaya M.S.

INDUSTRIAL REVOLUTIONS AND THE DEVELOPMENT OF THE AUTOMOBILE

Russia
Master's student, Ecological Faculty
Missmarychristmas@yandex.ru

Abstract: Humanity has been using the cars in all spheres of life. Breakthroughs in industrial technologies are closely related to transport. Transport has a negative impact on the environment and it is one of the causes of global temperature changes . New types of vehicles and fuel mixtures have been created to mitigate the harmful substances effect

Key words: Industrial Revolutions, the internal combustion engine, the hybrid type motor vehicle, electric motor

1. The First Industrial Revolution and steam engines

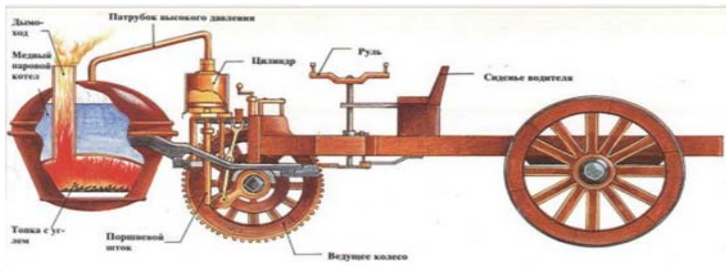
During the First Industrial Revolution the coal energy and steam engines were used in various sectors, especially in the rail system.

The first prototype of the car - the machine with a steam engine - was established in China in 1672 by Ferdinand Verbiest as a toy for the emperor. This car was small and could not carry the driver or passenger, however, it was the impetus for future inventions:

- In 1769-1771 Nicolas Joseph Kyunyu (France) demonstrated his experimental artillery tractor with a steam-drive;

- in 1784 William Murdock (UK) created a working model of a steam engine;

- in 1801 Richard Trevithick created a full-size car and drove it. Later, this design was complemented by the handbrake, a multi-stage transmission, improved steering. Public transport began to develop . However, cars with steam engines created



emergency situations on the roads. This type of engine was used m railway locomotives

Fig.1 Steam tractor N.Zh.Kyuno [1]

2. The Second Industrial Revolution and internal combustion engines

The Second Industrial Revolution was based on the combination of the oil power, motorization, centralized power supply due to the development of suburban areas and other areas.

In the first decade of the XX century, the emergence of electric media coincided with the widespread introduction of the internal combustion engine, and gave rise to the Second Industrial Revolution.

The electrification of factories opened the way for an era of mass production of consumer goods, the most important of which was a car. Henry Ford produced a car Ford Model T available for the people with a gasoline engine that changed the orientation of the space-time of humanity in the country, regional and global scales.

The Second World War greatly accelerated the industrial economy of the USA. The law on the financing of the construction of the federal highway system in 1956 gave additional impetus to the development of infrastructure for the automotive era.

The successes of the Second industrial revolution were based on the using of cheap, easily accessible oil within 70 years of the XX century

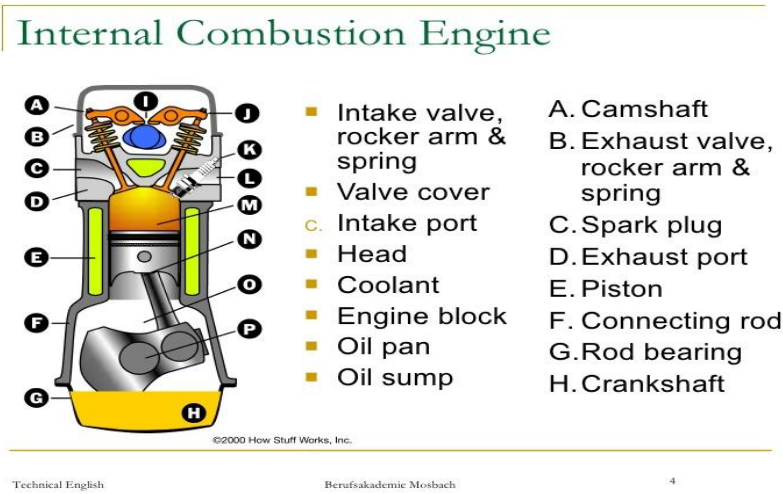
Table 1 The first cars with internal combustion engines

Year	Engine	Name of Inventor	Country
1806	ICE working on hydrogen-oxygen mixture	Francois Rivaz	France
1832-1891	Two-stroke ICE atmospheric later - four	Nikolaus August Otto	Germany
1880	The first gasoline carburetor ICE	Ognjeslav Kostović Stepanović	Russia
1885	Easy gasoline carburetor ICE	Gottlieb Daimler and Wilhelm Maybach	Germany
1899	First diesel ICE	Gustav V. Trinkler	Russia

Figure 2. Diagram of the internal combustion engine [2]

3.The Third Industrial Revolution and prospects of development of the automobile industry.

In 1806, Francois Isaac de Rivans created ICE running on hydrogen-oxygen mixture. Such fuel was not established itself at then as it was explosive.



In 1828 Yedlik Anosh (Hungary) invented a miniature model of the vehicle driven by the electric motor. Since then, the electric engine type cars started were depeloped.

In 1839 Robert Anderson created a full-fledged self-propelled electric carriage. But contemporaries recognized motors unusable due to shallowness of the batteries. In the 20th century gasoline and diesel beat internal combustion engines.

Humanity can not completely abandon the machines, which affect the environment. As a result, one of the possible solutions of the problem was the creation and use of hybrid vehicles.

The hybrid engine is a combination of the internal combustion engine and an electric motor. The first car with a hybrid engine was designed by Ferdinand Porsche in the 1900 - 1901 years. In the United States Victor Wouk began to develop hybrid cars in the 60s - 70s.

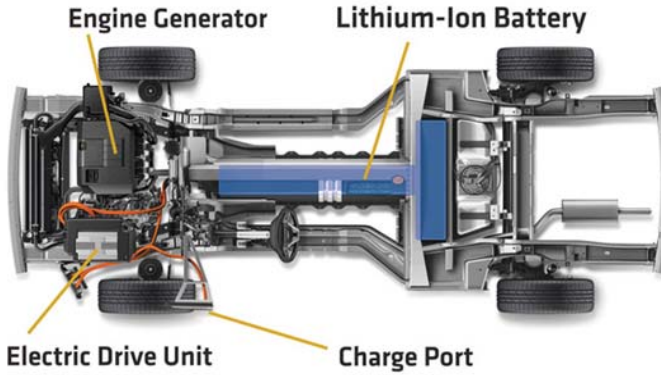


Figure 3. Scheme of the hybrid car[3]

Table 2. Advantages and disadvantages of a hybrid type motor vehicle

Advantages	Disadvantages
Economical operation Environmentally friendly Improved driving performance The increase in mileage range Saving energy and reuse	High complexity Battery Disposal

Fluctuations of oil prices and the deterioration of the global environmental situation dictate the necessity of development of new types of engines and fuels with improved characteristics. Currently there are plenty of systems that use water as an alternative fuel. One of them involves the generation of hydrogen by electrolysis: $2H2O \rightarrow 2H2 + O2$

Professor Yull Brown created a generator that splits water molecules into hydrogen and oxygen in a monatomic state. It is found that during monatomic hydrogen combustion and its interaction with the monatomic oxygen in 3.8 times more energy

is released in comparison with the combustion process of molecular hydrogen.

Using a Brown gas in internal combustion engines (ICE) allows to increase engine power, to increase the vehicle running with the same fuel consumption, to make completer combustion of the fuel mixture and as a result, to reduce the amount of harmful emissions.

Thus, the Third Industrial Revolution gives us hope that the world will be able to enter into a stable post carbon era by mid-century and significantly reduce the effects of global change climate.

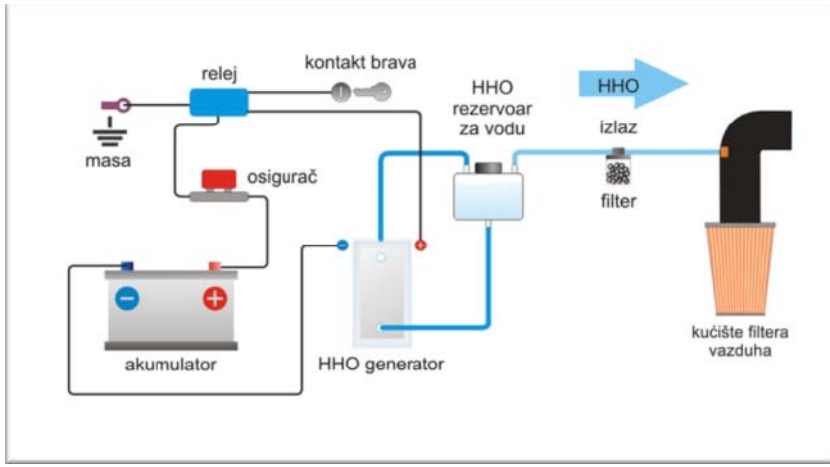


Figure 4. Driving a hybrid car running on gasoline and gas Brauna

I would like to thank the supervisors and Zvolinsky V.P. and Kapralova D.O. for helping in writing this scientific article.

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Tarasov I.V.[1], Kaderova R.G.[2]

Technologie des Zellstoffbleichens mit Ozon

RUDN University, Moscow

[1]ökologische Fakultät, Student

ivantarasov23@gmail.com

[2] ökologische Fakultät,reader

kaderova_rg@pfur.ru

Annotation: Die Aufgabe vom Prozess des Zellstoffbleiches – das Verleihen der Zellstoffe eine stabile weiße Farbe und bestimmte physisch-chemische Eigenschaften entsprechend ihrer zweckbestimmten Zuweisung.

Problem of process of a bleaching of cellulose – giving to cellulose of stable white color and certain physical and chemical properties according to her purpose. Ozone (O3) is one of a set of reagents at a cellulose bleaching.

Stichwörter:der Prozess, der Zellstoff, bleichen, das Zellstoffbleichen**,** das Ozon, die Reaktion, die Oxydierung, verwenden, die Konzentration, das Gas.

Headwords: process, cellulose, bleach, the cellulose-pale, ozone reaction, concentration, oxidation, gas.

Einleitung

Die Herstellung von Zellulose ist eine der schädlichsten chemischen Herstellungen. Dabei ist das Bleichen ein untrennbarer Bestandteil der chemischen Behandlung und Modifizierung vom Zellstoff. Es gibt eine Reihe von dabei gebrauchenden Technologien. Im Artikel, der wegen bestimmten Rahmen beschränkt ist, möchten wir Zellstoffbleichen mit Ozon betrachten, als der angepasste Prozess im Kontext der harten ökologischen Forderungen von allgemeiner Herstellung.

Technologie des Zellstoffbleichens mit Ozon

Ozon war als Bleichmittel für Zellstoff seit dem Jahre 1913bekannt, jedoch gibt es industrielle Anlagen für Ozon-Bleichen in unserem Land in Betrieb noch nicht.Aufgrund der hohen Anforderungen an den Umweltschutz in den letzten Jahren hat das Interesse die Ozonbleiche erhöht. In modernen Ozon-Bleichverfahren kann Ozon als Delignifizierungsmittel verwendet werden.

Derzeit verwendet die Industrie zwei Wege zur Ozonisierung: die durchschnittliche (8-15%) und hohe Konzentration (über 35%).

Aufgrund der erheblichen Kosten wird für Ozon in der Regel sofort nach SBB(Säure-Basen-Bleiche)oder am Ende des Prozess angewendet.

Schwermetalle (Eisen, Mangan, Kupfer, Kobalt usw.) beschleunigen die Zersetzung von Ozon (als auch H_2O_2), was zu einer starken Abnahme der mechanischen Eigenschaften von Zellstoff und einer deutlichen Erhöhung des Bleichchemikalienverbrauchs führt. Daher wird die Entwicklung der Bleichstufe der modernen Schaltkreise mit den Chelatisierenden (Sequestrierungs-) Mitteln zur Entfernung von Schwermetallionen eingeführt.

Ozon-Delignifizierungsbedingungen ist in der Gasphase bei einer Konzentration von 35-45%: Dauer 1-2 Min, Temperatur 40 ° C, der Ozondurchsatz von 1-2 % Fasern. Vor der Behandlung mit Ozon muss derZellstoff mit Schwefelsäure auf pH = 2-4

angesäuert werden. Unter diesen Bedingungen kann der Ligningehalt von Kraftzellstoff um 40-45% verringert werden. Die praktische Anwendung von Ozon verhindert eine schlechte Selektivität seiner oxidativen Effekte. Der Selektivität des Ozons wird während des Bleichensvon der Säurebehandlung des Gewichtes vor dem Bleichen und der präzisen Kontrolle der pH-Wert verbessert.

Vorteile des Ozonbleichens:

1.Verminderung des Teergehalt in Zellulose;

2. Reduzierung der Helligkeitsreversion;

3.Eine beträchtliche Verringerung der Verschmutzung und der Farbabflüsse;

4. Reduzierungdes Chlorverbrauchs bei der Bleiche.

Das Schema des Ozonbleichens ist bei einer hohen Konzentration der Masse auf Abb. 1.

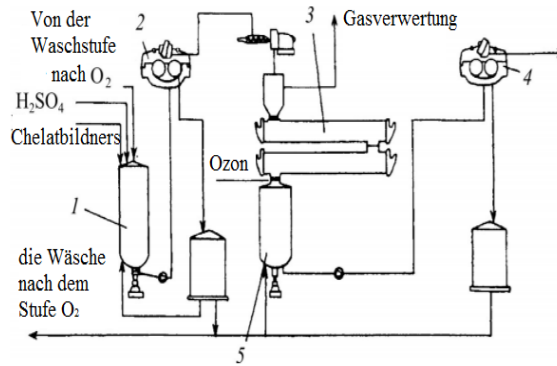

Abbildung. 1. Schematisches Ozonbleichen bei hoher Konsistenz (C-FreeTM-Verfahren): 1 - Chelierungsschritt; 2 - Entwässerungspresse; 3 - Reaktor; 4 - Waschpresse; 5 – Aufsatz

Die Zellstoffmassen werden nach den alkalischen Komplexen der Sauerstoffstufen-Delignifizierung auf dem Chelatbildungsstadium in einem sauren Medium verarbeitet und die Entwässerungspressekondensiert. Auf dem Ausgang aus der Pressewird eine hohe Konzentrationsmasse in einem speziellen Ripper dispergiert und durch eine Vorschubeinrichtungim

Ozonreaktor geleitet. Nach dem Reaktor wird die Masse in dem Turm abgelegen, an dessen Auslass verdünnt und der Waschpresse zugeführt wird.

Schlussfolgerungen

Trotz der hohen Kosten ist das Zellstoffbleichen mit Ozon, wie kein anderer, erlaubt den Wasserverbrauch und Chemikalien zu senken und auch die Anzahl von Schadstoffen in Abwässern zu erniedrigen.

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Tarasova E.A., Kharlamova M.D.

THE COMPARATIVE ANALYSIS OF THE METHODS OF ENSURING ENVIRONMENTAL SAFETY OF GAS EMISSION FROM INCINERATION PLANTS IN RUSSIA AND GERMANY

Master's student of the Department of Ecological Monitoring and Forecasting, Ecological Faculty
RUDN University, Moscow
okulova-lena@mail.ru

Abstract: The article describes the results of the conducted analysis and comparison of the environmental safety of the waste incineration plants of Russia and Germany taking into account the permissible concentrations of substances in the release. Additional measures to protect the air from the air-gas emissions are considered.

Key words: waste incineration plant, municipal solid waste, the best available technology, sanitary protection zone, pollutants.

Life activity of the mankind is directly connected with the appearance of the great amount of various wastes. Due to the growth of consumption the considerable increase in solid municipal waste (SMW) has taken place. To continue burying them is not considered possible, thus the main modern way to utilize SMW is to burn them obtaining thermal electrical energy.

Despite the need for WIPs lots of city dwellers object the in-city location of this enterprise, while it is considered normal in Europe. It is connected with the fact that the people are extremely worried about the quantity and quality of the gas release from the WIP.

In this article the analysis and comparison of the environmental safety of the waste incineration plants in Russia and Germany are carried out taking into account the permissible concentration of substances in the release and extra measures for the atmospheric air protection are suggested.

An incineration plant (WIP) is an enterprise that uses technology of processing solid waste through thermal decomposition (burning) in boilers or furnaces [1]. Targeted industrial use of solid waste as a fuel began with the construction of the first "incineration place" near London in 1870. It was during this period when the construction of big incinerators started in major cities and countries with a relatively small area and high population density [2]. According to the International Solid Waste Association the total number of incinerators in Europe alone exceeds 400. In Russia, there are only 243 waste recycling and 50 waste sorting systems, as well as 10 incinerators [2]. At present dozens of options of thermal technologies are offered for practical use. Depending on the temperature of the process all methods of thermal processing of SMW can be divided into two major groups: processes at temperatures below the melting point of the slag and processes at temperatures above the melting point of the slag [3]. To select the best available technology (BAT) for recycling solid waste the qualitative comparative evaluation of technologies of thermal processing of solid waste is carried out according to the following criteria:

- compliance of the technology with the latest domestic and foreign developments in the industry;
- economic and practical acceptability of this technology for the object of economic activity;
- justification for the use of this technology in terms of minimization of human impact on the environment [4].

As a result of the analysis of technical and economic characteristics the conclusion which of the methods of thermal utilization is more efficient can be drawn.

The objects of study were WIP №2 in Moscow and the German incinerators in Ingolstadt.

WIP №2, located in the north of Moscow, was put into operation in 1975 [5]. Due to the increased demands to the organization of the process of burning solid waste, technological equipment usage, quality of purification of flue gases, as well as

to the environmental safety, WIP №2 was stopped and posed for reconstruction in 1995. In 2000, the plant was put into operation again [5].

In 1970, a plant in Ingolstadt, Germany, was put into operation [6]. In 1990, two of the three lines of the plant were closed due to the fact that their equipment was outdated [6]. It was decided to upgrade the plant. A pilot run of the new lines was successfully completed in May 1996 [6].

The fire box of both plants is equipped with a back pushing furnace grid of German system "Martin". The temperature of the combustion of solid waste is 800-1000º C for WIP №2 and 900-1100º C for WIP Ingolstadt [5, 6].

The combustion control system at the German plant was 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 steady burning out of slag [6].

One of the most difficult problems that have to be solved to ensure the ecological safety of the solid waste thermal processing technology is the problem of the flue gas purification. **Table 1** shows the results of comparison of technologies used for cleaning gas emissions.

Table 1. The main stages gas emissions cleaning [5,6]

WIP #2		WIP in Ingolstadt	
Unit	Substance, which is cleaned	Unit	Substance, which is cleaned
$DeNo_x$ equipment	No_X	Catalyst equipment	No_X
Acid gases neutralizatio n reactor	HCl, HF, SO_2 CO, dioxins, furans	Scrubber	HCl, HF, SO_2 Heavy metals
Bag filter	Fly ash, dust, gas purification products, suspended solids	Reheating	CO, organics

Submission of activated carbon in the flue	Dioxins and furans, heavy metals	Fabric filter	Fly ash, dust, gas purifica-tion products, suspended solids, dioxins and furans
		Electrostatic filter	Fly ash, dust, gas purifica-tion products, suspended solids, dioxins and furans
		Forced draft	CO

The table shows that WIP №2 has only four stages of gas cleaning and the German plant - six. This explains the difference between quantitative and qualitative composition of the plants' emissions.

Table 2. Cleaning efficiency gas emissions [7]

Substance	Degree of purification of the gas mixture			
	Russia		Germany	
	According to the plant	According to the manufacturer	According to the plant	According to the manufacturer
NO_x	80-85%	60% at T=850ºC 70% at T=900ºC 80-85% at T=980ºC	97%	95%
CO			97%	90%
HCl	90-93%	80-85%	90-95%	85-90%
HF	90-93%	80-85%	90-95%	85-90%
SO_2	80-85%	70-75%	90-95%	85-90%
Dioxins, furans	95-97%	95%	95-97%	95%
Heavy metals	90-95%	75-80%	95-97%	90-95%
Aerosols	90-95%	70-75%	95-97%	90%

Table 2 shows the values of the efficiency of gas emissions purification at the WIP for separate substances. For a more obvious representation of the results there are some extra columns, which specify the value of purification efficiency according to the manufacturer.

The results of the analysis of the legal and regulatory framework of the Russian Federation and Germany in the field of quantitative and qualitative monitoring of emissions are presented in **Table 3** [8; 9]. The key documents are in italics.

Table 3. The legislation of the Russian Federation and Germany

RF	Germany
HS 2.1.6.1338-03. The maximum permissible concentration (MPC) of pollutants in the ambient air of populated areas	The decree number 17 on the implementation of the German Federal Law about Pollution control (regulating incineration and co-incineration of municipal solid waste - 17.BImSchV)
The Federal Law "On Air Protection“of 4.05.99 № 96-FL (articles 9, 12, 14, 16, 18, 22, 25, 30)	The Directive of the European Parliament and of the Council of the European Union №2001/80/EU of 23 October, 2001, "On the limitation of emissions of certain pollutants into the air from large combustion plants"
Public health regulations 2.1.6.1032-01 "Sanitary requirements to ensure the quality of ambient air of the populated areas"	The Directive of the European Parliament and of the Council of the European Union № 2000/76/EU of 4 December, 2000, "About Waste Incineration"
	The Directive of the European Parliament and of the Council of the European Union № 2008/50/EU "About air quality and measures of cleaning it "

In Russia, the legislation is arranged in such a way that measuring of the concentrations of substances permissible in the release is made on the border of the sanitary protection zone (SPZ), and this value must not exceed the hygienic standards prescribed by law. In Germany, there are emission standards for

each type of production, which are included in the legal acts. Their monitoring is performed directly at the source of emissions (the mouth of the pipe). **Fig. 1** shows the comparison of standards of pollutant emissions in the Russian Federation and Germany.

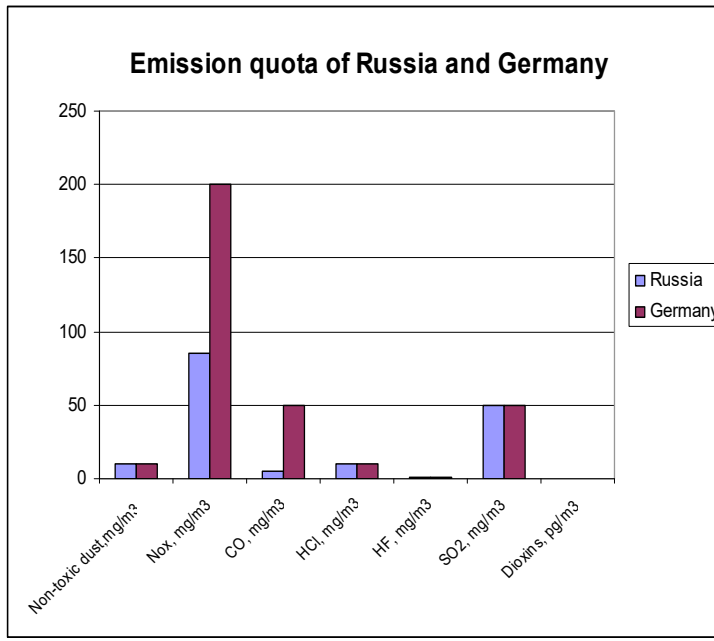

Fig. 1 Comparison of pollutant emission standards in Germany and Russia [8; 9]

The diagram shows that for some substances, such as non-toxic dust, hydrogen chloride, hydrogen fluoride and sulfur oxide (IV), the standards of permissible concentrations in the release are the same, and even lower as for dioxins in Germany. Taking into account the fact that in Germany, the monitoring is carried out at the source of emissions, and in Russia on the border of the SPZ one may conclude that the German legislation is stricter in regulation of gas emissions from incinerators.

Table 4 represents emissions from WIP №2 and the WIP in Ingolstadt, and the MPC of pollutants in accordance with the legislation of the Russian Federation and Germany.

Table 4. Comparing of Russia and Germany WIP emissions [5, 6, 8, 9]

Substanse	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 it can be seen that WIP №2 has higher permitted in the release concentrations of such substances as: non-toxic dust, carbon monoxide, hydrogen chloride, sulfur oxides (IV), dioxins.

It is directly related to the efficiency of purification. The German factory applies more gas cleaning steps that allow to achieve greater results.

Having analyzed the measured data and the effectiveness of purification of the gas mixture at the outlet of the pipe at both plants we have come to the conclusion that WIP№2 needs to add more stages of gas purification or replace those available ones with more sophisticated ones.

WIP№2 needs an additional filter. In order to select the most optimal variant, 4 types of filters were considered according to the following criteria:

• optimal temperature for their effective work,

• particle size of suspended solids, from which cleaning is done.

• cleaning efficiency.

• and cons of this type of filter.

As a result of the comparison it was found out that the most effective filter with the largest size range of particles to be removed is an electrostatic filter.

In addition to the additional filter, you also need new equipment or upgrading of existing one cleaning acidic impurities off exhaust gases.

The comparative analysis of the existing methods demonstrated 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 whose mass fraction of active CaO + MgO should be not less than 80 % [10].

Conclusion:

1. In accordance with the calculated selection criteria BAT modern systems of waste incineration on the furnace grid are optimal.

2. It was found that the use of an infrared camera can increase processing time in the main combustion zone and keep it in the desired high-temperature regime, which limits the formation of dioxins.

3. The general parameter of gas emissions controlled in Russia and Germany is permissible concentration of substances in the release, so it is advisable to make a comparison in this respect.

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Tkacheva A.S.[1], Korobova O.S.[2]

PROSPECTS OF INTRODUCTION OF THE BEST AVAILABLE TECHNOLOGIES OF CEMENT PRODUCTION

[1]Associate Professor, Department of Applied Ecology, RUDN University
[2]Master's student of the Department of Applied Ecology, Ecological Faculty
RUDN University, Moscow
bezfanta@mail.ru

Abstract: Strengths and weaknesses of the functioning of the cement industry were analyzed.

Key words: the cement industry, ecologization of production, strengths and weaknesses of the functioning of enterprises, deterioration of the equipment, environmental payments, modernization, best available technologies.

There is a wide range of interpretations of the intensity of human impact on the biosphere from alarmist ones about the inevitability of environmental disaster to neglecting ones that ignore the obvious facts of the increasing human impact on the environment. This also concerns the problem of achieving balance between economic and environmental objectives. Unfortunately, rather often in modern society the myth of the high financial cost of greening of production is spread. This opinion does not take into account the long-term and medium-term environmental costs and is associated with the use of certain technologies, especially the so-called environmental technologies, which are used "at the end of the pipe". More advanced integral approach allows to design the production process so that it becomes possible to prevent or significantly reduce the formation of polygonal waste, thus predetermining the high competitiveness of the enterprise especially at environmentally sensitive markets.

As it was stated above, the introduction of best available techniques in the cement industry is one of the main tasks for the medium term. The term "best available techniques" is defined in Article 1 № 7 of the Federal Law "On Environmental Protection" / 1 / according to which the best available technology (BAT) - the technology of production of products (goods), works and services, determined on the basis of modern achievements of science and technology and the best combination to achieve environmental protection criteria, if technical possibility of its application is available.

In the cement sector the Union of cement producers, together with the leading expert and analytical organizations have developed an industrial reference book on BAT, implementation of which will not only improve the environmental performance of the industry, but also will contribute to the accelerated technological development. The structure of the reference book on BAT "Cement production" corresponds to the preliminary national standard PNST 21 -2014 / 2.4 / and the format of description of technologies - to the preliminary national standard PNST 23-2014.

The Guide is recommended to enterprises of the cement industry for the preparation of BAT implementation programs, to regulators - to assess compliance with environmental requirements of enterprises and to government agencies - to make a decision on the state co-financing of investment projects (modernization projects).

The amendments to Federal Law 219 are designed to create economic incentives for businesses to reduce emissions and discharges of polluting substances to the environment. There is a gradual increase in charges for negative impact on the environment; introduction of a system of integrated environmental permits issued if there are programs to improve the environmental efficiency; introduction of the institution of the state ecological examination of the major infrastructure projects.

The proposed rules will strengthen supervision of large polluting enterprises while reducing excessive regulation in this area / 3.5 /.

The introduction of the rationing system will be carried out in stages. The first phase of implementation is scheduled to begin in 2018. The integrated environmental permit to the technological standards will be issued to all newly built ecologically dangerous objects. On the basis of BAT from 2020 emission standards will be calculated for industrial enterprises. Those who do not have time to modernize production and reduce emissions would be allowed to agree on the temporary regulations, fees for exceeding them will grow up to 25 times compared to the present, and for exceeding the allowed limits - up to 100 times. As economic incentives for businesses that move to BAT, the fee for "emissions beyond the norm" cannot be charged if the money is spent on the implementation of BAT, and after the implementation of the best technologies there will be a zero coefficient. After 2022 all other major operating businesses will be transferred to the system of technological standards and integrated environmental permits.

Using the BAT Reference book industrial enterprises may not wait for 2019 - the beginning of an integrated environmental permitting - to assess whether the parameters of emissions and discharges of the enterprise comply with technological parameters of BAT, and if such a system is established they can receive, on a voluntary basis a certificate of compliance indicating environmental safety and helping the enterprise to take advantage of the market / 4,5 /.

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Zavedenskiy K. E.

The comparison of technologies and methods of capturing solar radiation.

Master`s student of the Department of Ecological Monitoring and Forecasting, Ecological faculty
RUDN University, Moscow
kirillzav3@gmail.com

Abstract: One of the most perspective source of renewable energy is solar radiation. Actually there are different technologies to capture solar energy. Advantages and disadvantages of available technologies and methods of capturing and concentrating heat solar energy have been considered especially in case of using it as a source of energy for buildings.

Key words: ecology, Sun, sunlight, solar energy, solar radiation, renewable energy sources.

One of the most perspective source of renewable energy is solar radiation. According to the research conducted by IEA (International Energy Agency) the annual market of solar energy

in 2015 was nearly 10 times the world's cumulative solar photovoltaic system capacity of a decade earlier [1].

Actually we have technologies which can capture solar energy in two forms: 1. Thermal energy systems capture solar infrared radiation energy with solar collectors. Collected energy is used to heat water and space. There are also technologies to generate electricity with solar heat by heating the working fluid in heat engine and drive the generator; 2. Photovoltaic systems capture the sun's higher frequency radiation (visible and ultra violet) in an array of semiconductor, photovoltaic cells which convert the radiant energy directly into electricity [2].

This study is dedicated to advantages and disadvantages of solar energy technologies application in building.

Type of Concentration of Solar Radiation

Most common types of solar radiation concentration are:

1. Point concentration
2. Linear concentration

The type of concentration of solar radiation affects the amount of heat transferred through the irradiated surface [2].

In the case of point concentration, the total quantity of heat captured with receiver surface is large, the temperature of surface for the solar radiation differs from the input temperature of heat transfer. This method requires complicated solutions of materials, heat-transfer capabilities, cooling technology, cleanliness, and protection against overheating.

In the case of linear concentration, the quantity of heat captured with receiver surface is lower. Therefore, to save necessary amount of energy the total surface should be larger, as there are more losses of heat. This method does not require complicated solutions of materials, heat-transfer capabilities etc.

There is an optimized configuration for the concentration of solar radiation called bundled concentration, which summarizes advantages of two methods. It uses simple technology operating at high temperatures with minimum heat losses. For such a design, total surfaces for the heat transfer should be larger than

with point concentration but not too large in order to avoid heat losses [3]. Figure 1 depicts the basic design of point concentration, linear concentration, and bundled concentration.

Shape of Mirrors for Concentration of Solar Radiation.

The concentration of solar radiation for power generation is achieved by using four types of mirrors and lenses: flat mirrors or heliostats; frensel-shaped configurations; parabolic trough-shaped mirrors; parabolic mirrors [4]. The available combination for ways of concentrating radiation are presented in figure 2.

The main feature of flat mirror is the ability of tracking Sun on two axes. Therefore, optimized angle of receiver could often be reached [5]. In opposition, parabolic trough mirrors and Fresnel mirrors can track the sunlight only on one axis. That is why this types of mirrors is much less effective in the morning and in the evening. The parabolic trough shape is a purely geometric feature for concentrating solar power. Fast computing capabilities for exact focusing and repeated alignment calibration of unlimited numbers of flat mirrors are likely to supersede the geometric parabolic trough design, as electronics often simplify the design of mechanical systems [6].

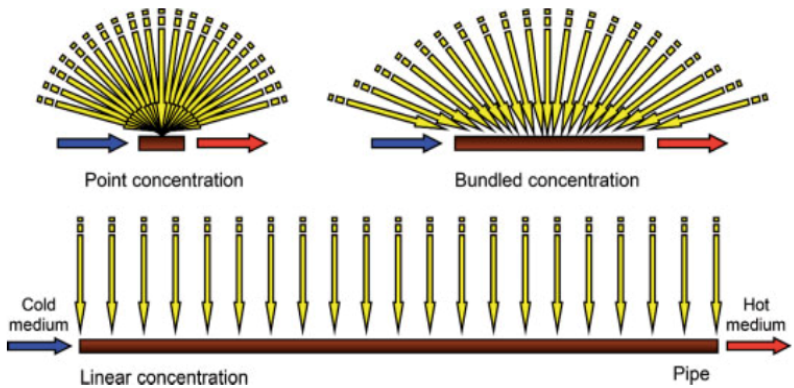

Figure 1. The types of solar radiation concertation.

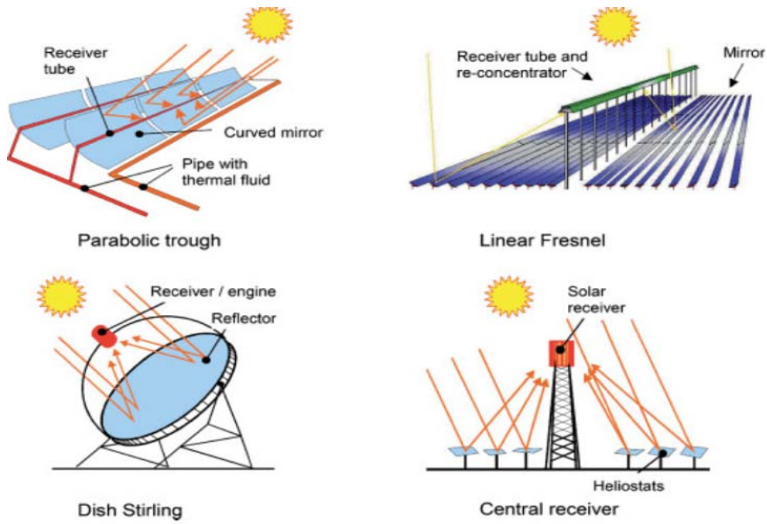

Figure 2. Established configurations for concentrating solar thermal power plants.

The comparison of available technologies of capturing solar radiation allow to choose the most appropriate technology for building industry which should integrate bundled concentration and flat mirrors to achieve robustness of technology; good size of solar power plan; capability to produce electricity day and night.

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Zhavoronkova K.A.

A POWER PLANT RUNNING ON BIOGAS AS AN ALTERNATIVE ENERGY SOURCE

Master's student of the Department of Applied Ecology, Ecological Faculty, RUDN University, Moscow

Kariwka777@mail.ru

Abstract: The article reveals all the advantages of a gas-engine power station using biogas over other power plants.

Key words: gas-engine power station, biogas, natural gas, generation, cogeneration, trigeneration, methane, sulfur dioxide, nitrogen oxide, biomethane, waste.

Today, there is a huge number of energy sources from mechanical to electric energy, which is now considered the most important and necessary. To obtain it, mankind has invented a lot of ways, such as a nuclear power plant, a hydroelectric power plant, various generators, and more. Today we shall talk about one of these power plants, the so-called gas piston power plant. It is used to generate electricity, natural gas or other of its kinds.

Gas piston power plants - an optimal variant for the entities and other power consumers who want to reduce the cost of payments, increase energy efficiency and gain energy independence from centralized supply networks [1].

What is a gas piston power plant?

A gas piston power plant is the system of generation created on the basis of a piston internal combustion engine running on natural gas or other fuel. In our work we shall consider the GPU running on biogas. By using the GPU two types of energy may be generated (heat and electricity), and this process is known as "cogeneration". In case gas turbine power plants use technology to produce also cold (very important for ventilation, cooling warehouses, industrial refrigeration), this technology will be called "trigeneration" [2].

Influence of a Gas Piston Power Plant on the Environment

Like all power plants, the GPU can not affect the environment positively. However, since the GPU run on natural gas and biogas, they emit the smallest amount of harmful substances.

During the combustion of gas there is the smallest amount of harmful pollutants, so the gaseous fuel is considered the most environmentally friendly. And the combustion of liquid and solid types of fuel is followed by the formation of hazardous gases (sulfur dioxide and oxides of nitrogen), formation of dust aerosols, ash is obtained [3].

The advantages of GPU

1. Saving money

Cost value of electric power generated by gas-piston units is several times lower than the rates offered by centralized networks. The price for the GPU is less than 2 p. per kW and that of the centralized network - is about 5 p. per kW. The building of an autonomous gas piston power plant is justified also by the fact that the source of power is located on the territory of the entity or in the immediate vicinity. Such expensive components as transformer substations and power lines are excluded from the scheme of power supply. This approach allows to significantly reduce capital investments in the provision of reliable and uninterrupted power supply of the object.

The average time of return of investments into a gas-piston power plant constitutes only 3-5 years. In view of rising

electricity tariffs and the high cost of connection to centralized networks, this period may even be reduced.

2. Independence from the monopoly companies

Because the enterprise has its own generation, then it no longer depends on the monopoly companies (city mains). The Power Center is completely on the balance of the entity.

3. Economy of fuel and resources

GPU can run on biogas using organic waste of their enterprise, without spending money on the company's waste management, as well as after cleaning the biogas from the carbon dioxide we get biomethane, which in turn is an analog of the natural gas. Therefore, we do not need to buy natural gas.

By using modular options for installing the GPU it is possible to use several units instead of one powerful unit and to regulate their work in a more efficient way, increasing a general resource of work and saving resources.

4. Possibility of recycling of waste

Instead of hiring special companies for the disposal of organic waste. Waste such as - chicken manure, cattle manure, etc. is used as a fuel for a gas piston power plant. Since natural gas-fired power plants can run on biogas. In block preparation of biogas GPU waste under the influence of hydrogen or methane fermentation of biomass turns into biogas.

5. Minimum environmental pollution

Gas piston power plants in comparison with other power plants pollute the environment less than all, as they work on natural gas or biogas. During the combustion of gas the least amount of harmful pollutants is emitted, therefore the gaseous fuel is considered the most environmentally friendly. Production of biogas allows to prevent methane emissions into the atmosphere. Methane has an impact on the greenhouse effect by 21 times stronger than carbon dioxide does, and is in the atmosphere for 12 years. Capturing methane - the best short-term method to prevent global warming [5].

The processed manure, the bard and other waste, after obtaining biogas are used as fertilizer in agricultural industry. It allows to reduce the use of chemical fertilizers, load on ground waters is reduced.

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Zlotnik S.A.

SOLAR ENERGY

Russia
Bachelor's student, Ecological Faculty
RUDN University, Moscow
tusika05@mail.ru

Abstract: This article describes one of the kinds of alternative energy – solar energy; basic advantages and disadvantages; the basic techniques of this technology and places, where solar energy is used.

Key words: alternative energy, solar collectors, inexhaustible, territorial costs, plate with photocells.

Solar energy - the direction of alternative energy based on the direct use of solar radiation to generate energy in any form. Solar energy uses renewable energy sources [2, p. 163].

People use solar energy mainly by two methods - in the form of thermal energy by using different termosistem or by photochemical reactions.

The most widely used technology in the world to use solar energy for hot water and heating. For this purpose, sufficient low-temperature energy. Installations and systems of solar heating are divided into passive and active [3].

In passive systems, the absorption and accumulation of solar energy is directly elements of building constructions with little use of additional devices or without them.

Active systems based on the use the collectors, which convert solar energy into heat [5]. Solar collectors can be used in a variety of low-temperature processes. For example, in the food industry for pasteurization of products; for cleaning the cans, bottles, drying of agricultural produce and even buildings.

The use of solar energy in the world seems to be very promising because it is available in large quantities at minimum cost. The total amount of energy radiated by the star is extremely high, but the Earth's surface gets about 47%. The power of solar

radiation and use of energy in the world depends of different factors: the climatic conditions, the angle of incidence on the surface, season and geographical location [1, p. 12].

The main benefit is inexhaustible. Despite the many hypotheses, the probability that a star like the Sun will go out soon, is extremely small. So, before mankind discovered the opportunity to receive a completely clean energy naturally.

The second benefit of using solar energy in the world is environmentally friendly. The environmental impact will be zero.

Finally, special attention should be paid to the fact that the use of solar energy is the least danger to the person.

Now pay attention to the shortcomings of this method, which, unfortunately, no less. Solar energy recovery in sufficient quantities requires huge territorial costs. The point is that the larger the area consumption and processing of solar radiation, the greater the amount of clean energy we obtain at the output. Placement is such huge systems require a large amount of free area, which causes some difficulties.

Another problem concerning the use of solar energy in the world, is directly dependent on the time of day, as the production will be zero at night, and in the morning and evening negligible. An additional risk factor is the weather - sharp change of conditions may negatively affect the operation of such systems [4].

The use of solar energy in the world is difficult at the moment because this is expensive. Photovoltaic cells necessary for the implementation of the basic processes, have a high cost. Of course, the positive aspects of the use of such resources make it pay off, but from an economic point of view at the moment do not have to talk about full cost recovery expense [2, p. 170].

Previously it stated that the use of such resources can save mankind from quite serious environmental problems in the future. Source of resources and the final product is truly the most environmentally clean.

However, the principle of the solar collectors is the use of special plates with photocells, which are required for the manufacture of mass noxious substances as lead, arsenic, or potassium. The use of these photocells does not bring damage to the environment, however, limited their service life, eventually recycling of plates can be a serious problem.

One of the most important resources for mankind - solar energy, and the prospects for its use are extremely high. The industry is actively financed, expands and improved. Now solar energy the most developed in the United States, where some regions are using it as a full-fledged alternative source of supply. The same power plants of this type work in the Mojave Desert. Other countries for a long time set a course for this kind of electricity generation that soon may will solve the problem of environmental pollution [4].

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8. GREEN BUILDING

Senani Djamal Eddine

BÂTIMENT VERT ENTRE LE PASSÉ ET LE PRÉSENT

Doctorant du Département d'Ecologie Systémique de la Faculté écologique de l'Université russe de l'Amitié des Peuples
Algérie
senanijamal7@gmail.com

Résumé: La présente étude a pour but de faire des recommendations sur des matériaux naturels necessaires pour des construction modernes respectant l'environnement. Des maisons de boue s'imposent comme une solution possible et nécessaire.

Mots clés: bâtiments traditionnel, construction d'argile, technologies vertes modernes, architecture dans la desert

Dans cette étude nous nous sommes basés sur la possibilité de fusionner la technologie moderne avec des pricipes du bâtiment traditionnel de boue [3] sans porter préjudice au patrimoine culturel algérien. Ghardaïa-Algérie, cette éco-ville dans le Sahara [2] est un projet qui a pour objectif de faire fleurir le désert, faire en sorte que tous les habitants puissent planter des arbres et recycler leurs déchets [4]. Donc, la problématique est : comment construire un village écologique et moderne sans déformer l'image publique du Village [5].

Méthode du travail: Nous avons analysé la pratique et les procédés du green building appliqués à la situation et au climat algérien, chaud et sec.

*Résultats.*Un green building construit avec le respect de l'environnement constitue un ensemble de moyens et de procédés suivants : 1. La gestion de l'eau ; 2. Solutions pour l'air ; 3. Cour intérieure ; 4. Utilisation de l'argile ; 5. Plafonds voûtés ; 6. Ouvertures créant de l'ombre ; 7. Plantes ; 8. Couleur blanche ; 9. Sources d'energie renouvelables

Discussion.

1. La gestion de l’eau ;

- Dans une citerne, les eaux usées sont traitées et filtré en utilisant du sable et des filtres biologiques. Ensuite elles sont réutilisées pour irriguer les jardins.
- La collecte des eaux pluviales permet de réduire la consommation d'eau.
- Fontaine de la cour intérieure positionnée comme le centre de la maison (différentes formes et conceptions).
- Nous avons installé sur de la paille des fentes constamment humidifiées avec de l'eau par une petite pompe. L'excès d'eau va dans le réservoir vers le bas par un canal. Ensuite, il refroidit l'air intérieur de la tour et revient à nouveau pénètrant dans le bâtiment avec l’aide d’une pompe.

2. Solutions pour l’air.

Une bonne ventilation de la maison est considérée comme l'un des facteurs les plus importants pour surmonter la concentration des polluants.

3. Cour intérieure.

Cette conception inclue obligatoirement une cour intérieure qui a plusieurs avantages:

a) l'air refroidie dans la nuit aide à faire face à la chaleur extrême pendant la journée ;

b) un supplément de l'éclairage ;

c) de la ventilation naturelle ;

d) du confort psychologique en contemplant les plantes;

e) purification de l'air par des arbres et des plantes vertes

4. Utilisation de matériaux poreux.

L'argile est naturelle et disponible dans la plupart des régions d’Algérie, ce qui fait la population locale préférer ce matériel. Elle ne demande pas beaucoup d'énergie lors de sa fabrication (seulement 1% de l'énergie nécessaire pour produire du béton [4]) dont le prix est bas et la methode est simple et facile à apprendre.

La construction ne demande que certains moules et outillages. Ces matériaux de construction thermiquement isolant sont adaptés à l'environnement, ce qui permet de maintenir une température agréable à l'intérieur du bâtiment, en hiver et en été.

5. Plafonds voûtés en hémisphère ou demi-cylindre toujours à l'ombre fait que l'air sur des surfaces courbes augmente de vitesse ce qui abaisse la température des plafonds.

6. Fenêtres et ouvertures créant de l'ombre. Cela est l'un des facteurs les plus importants qui contribuent à la qualité de conception green building climatique.

7. Éléments végétaux couvrant les façades tels que arbres, arbustes, La façade ouest doit en avoir surtout grimpant et à feuilles persistantes. La façade sud en a à feuilles caduques.

8. Peinture blanc des murs, qui reflète les rayons du soleil.

9. Batteries solaires. Utilisation de l'énergie naturelle.

Conclusion: Les résultats obtenus démontrent que la maison qui unit les traditions et la modernité a des avantages suivants : l'argile est la meilleure matière qui ne produit de pollution ni lors de la fabrication ni au cours de l'exploitation ou dans le cas de la démolition du bâtiment. La réutilisation des eaux usées a de nombreux avantages. Une résidence qui marie la tradition du désert et les technologies modernes offre un climat modéré et reste saine, fraîche en été et chaude en hiver. Une telle maison est sure, n'a pas peur d'incendie, est bien adaptée au climat, n'est pas nocive pour l'environnement.

Nous recommendons de lancer des campagnes de sensibilisation, afin que le bâtiment écologique devienne dans la conscience humaine un fait de la culture générale.

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Yukhno M. D.

WATER-SENSITIVE URBAN DESIGN AS A SOLUTION FOR WATER SUPPLY ISSUES

Bachelor student, Ecological Faculty
RUDN University, Moscow
maks.yuhno@ya.ru

Abstract: This work describes methods of saving water resources and supporting livable urban places by water-sensitive urban design, focusing mainly on a city case.

Key words: green building, life cycle assessment, water-sensitive urban design.

Introduction. Our cities, towns and villages all have a long and intimate relationship with water and were historically located around a water source, watercourse or coastline as the focus point for life and trade. In modern times, not only do we depend on clean water supply for our daily needs, but we also depend on water to grow our food and produce resources, to transport our goods and waste, beautify our urban areas and provide fun and recreation. Water is often central to the identity of a place. Yet the relationship between the places we live and the water resources we depend on is often not prioritized in the design and evolution of those places. Water shortages, flooding and watercourse pollution are all signs of stress where developed areas have a troubled interaction with the natural water cycle and where, conversely, water has become fact that although there is a vast amount of water on the planet? Sustainably managed water is becoming scarce (Fig.1) risk or a nuisance rather than an asset or an opportunity [1].

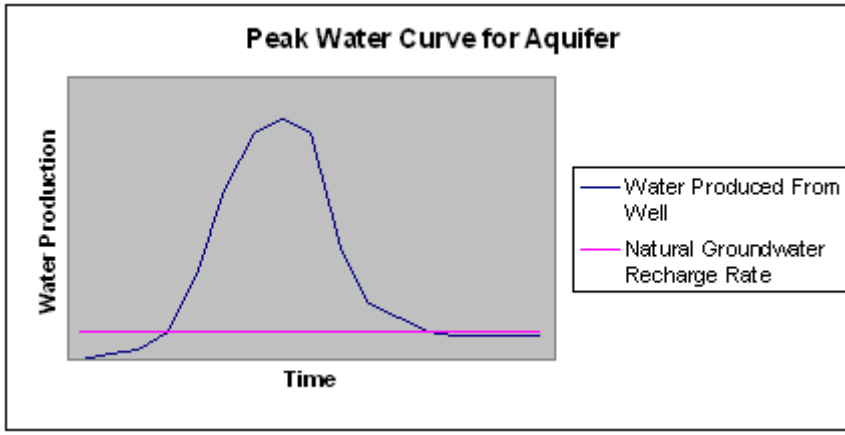

Fig. 1 Potential peak water curve for production of groundwater from an aquifer. [2]

Unreasonable using of water resources can become a cause of the two principles are essential to its application:

1. All elements of the water cycle and their interconnections are considered concurrently to achieve an outcome that sustains a healthy natural environment while meeting human needs.
2. Consideration of the water cycle is made from the outset, and throughout the design and planning process. Accordingly, water management solutions seek to meet the expectations and aspirations for design of successful places.

Talking about a water sensitive city we should mansion:

1. Urban form: large urban area centered on river corridor, city center dominated by paved areas, significant growth targets.
2. Water context: lack of capacity in sewer system, serious flood risk, high rainfall and low water stress.
3. Community context: pockets of deprivation, neighborhood parks and recreation space needed

A Water Sensitive City must include:

- Energy generation: using the wastewater treatment plants and water flow to generate energy from captured water.

- Sewer mining: intercepting wastewater in sewers to treat for irrigation of new parks in summer. Removes water from strained infrastructure.
- Capture runoff for use: reduces pressure on infrastructure and flood risk by using water on a strategic scale.
- Flood resilient housing: if an area floods, homes and public spaces are designed so that the impacts are minimal.
- Summer water park: during the summer, water features are filled and plants watered using harvested rainwater and runoff.
- Adaptable river edges: public recreation space that provides access to the river while being designed and managed to accommodate flooding.
- Green grid: allows surface runoff to infiltrate, provides a habitat for wildlife and attractive spaces for people.
- Urban floodplains: areas designed to flood at times of high water levels.
- Exceedance routes: designed to direct flood waters safely away from properties during extreme rainfall. These routes could be roads or blue-green corridors where flooding can be managed.

Conclusion.

Water Sensitive Urban Design is an opportunity to create beautiful, successful and resilient places.

It is undeniable that the relationship between water and our urban areas needs to be given a higher priority to provide integrated solutions to flood risk management, sustainable water use and supply and the improvement of water quality in our treasured watercourses.

This priority needs to be applied in an integrated way by the people and partners that plan and design the built environment. In doing so, we can bring together the skills and creativity of practitioners who plan and design the places we live in to bring much wider benefits to communities.

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Zhabina Yu. A.

Prospects of use of RES in a private household in the conditions of midlatitudes of the Russian Federation

Master's student of the monitoring Department, Ecological Faculty, RUDN University, Moscow

yulia7469@mail.ru

The issue of renewable energy is faced by all countries. The vast number of countries have already used and expanded the use of renewable energy sources in different scale. There are the processes to establish a common energy space, as well as the emerging international market for plants and renewable energy conversion.

Traditional sources of energy such as gas, oil, coal eventually deplete. By some estimates, it is not distant future. However alternative energy sources make it possible to build a house, partially or completely independent from the central network.

By renewable energy sources we mean the forms of energy such as geothermal, solar, sea waves, wind, energy currents, tides, ocean, biomass, low-grade thermal energy, hydro power and other "new" forms of renewable energy. The energy consumed by the house is spent on heating, lighting and the use of various electrical appliances. Fossil solid or gaseous fuel (rarely fuel oil) are usually used for heating a house. The use of electricity for these purposes is rather an anachronism than a promising direction.

If we exclude from consideration the heating, the remaining consumers are electric and require electricity. In this context, for the design of power supply is necessary to have information on

the graphs of power consumption or the change of power consumption, as well as data on current electricity rates.

To have a rough idea of what renewable energy can be used in a private home ownership today, the actual proposals of the representatives on the basis of renewable energy plants market have been observed. (Table 1)

18 ads were reviewed, 8 of which use solar energy, wind to 5, 5 to the low-potential geothermal. An excerpt from the table

Table 1. Market analysis systems based on renewable energy for private use in housing construction.

Name	Manufacturer country	Price RUB	Power	Life time	Optimization for RF
A solar panel EW-310W	EnergyWind (Russia)	30 000	0,3 kV	From 30 years (1 year warranty)	Yes
Fixed solar panel 128K	FSI "All - Russian Research Institute for Electrification of Agriculture"	14 000	0,15 kV	not indicated	Yes
The heat pump (air \ water) Brosk Mark II 100	Brosk (Rusia)	278 000	11,1 kV	not indicated	Yes
The heat pump (air / water) Brosk Mark II 200	Brosk (Russia)	446 000	21,7 kV	not indicated	Yes

We assume that we create a system for a private house of 378 m^3, which is located in the middle lane. The most accessible alternative energy sources will be solar panels, heat pumps and biomass for heating (wind energy is inefficient, since its use is possible at speeds ranging 5 m / s, and water bodies, potential for use, do not occur everywhere, in addition, there may be problems with the use of off-site boundaries).

Thus, after the units offered on the market of Russia analysis, for the calculation were chosen: a solar panel AXITEC AC-310P/156-72S and Heat pump Brosk Mark II 200.

Provided the installation at the site of the three solar panels AXITEC AC-310P / 156-72S, approximate savings in the first half will be about 10,582 rubles, and in the second half of the year about 10 507rub.

Totally it amounts to 21 000 rub. (Single rate) of economy/ per year . Provided that you have installed three solar panels AXITEC AC-310P / 156-72S, cost 24,264 rubles. Each, they will pay for itself in about 3.5 years.

If we take into account the experience of operation of private homes, it becomes evident that the use of certain active solar systems only is inefficient. Given the fact that the house will be used all year round, when there is an obvious variability in the intensity of received solar energy will be much more successful use of the combined system from several different types of units to the RES.

There are several types of heat pumps, they are distinguished by the type of heat source used to heat the home:

o Ground - Water

o Air - water

o Water – Water

The required capacity of the heat pump needed to be treated at home, according to a standard formula

$Q = k * V * \Delta T$,

where Q is the heat loss at home, k - generalized heat transfer coefficient of the building (for a well-insulated house, it

is 1), V - volume of the room, ΔT - maximum temperature difference between the room and the outside air and the volume of the house) for a given area of 378m3

Q = 1 * 378 * 50 = 18 900 kcal / h, which is equal 21kVt.

When set on a plot of heat pump Brosk Mark II 200, with a capacity of 21.7 kW, it can pay for itself from 3 to 5 years.

According to the literature, various technologies of biofuel-based energy for non-industrial use (table 2) have the following characteristics, according to which the most the promising for use in the average private home can be considered as biogas.

Table 2 the main characteristics of heating systems based on biofuels

Type of fuel	installation cost	Rated power	efficiency	Price RUB
Biogas	265.897,88 rub	134 kV	92,5–94%	0,05
Chips	410.000rub	100 kV	93,3%	1.33
Peat	555.000 rub	100 kV	82%	1,6
Straw	3 862,07 €	160 kV	at least86%	0,9

After analyzing the weather conditions on the territory of Moscow and Moscow Region, we can say that choosing only a renewable source for energy is not enough, so it will be better to use a combination of several sources, and we will get uninterrupted power supply system and heating our homes. Operation of such housing and energy complex, consisting of several solar panels, heat pump and installation of biogas, for private homes, will cost about 784,690 Rubles and will be repaid in full for a period of about 10 years, will not only reduce the use of non-renewable energy sources, but also to exclude or to minimize adverse effects on the energy environment.

I would like to thank my research supervisor Kapralova DO for her help in writing this scientific article.

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Zhuravlev S.D.

HEALTHY BUILDINGS AND THE HEALTH OF THEIR OCCUPANTS

Bachelor's student, Ecological Faculty
RUDN University, Moscow
stzhur@mail.ru

Abstract: Research worldwide shows that environmentally-friendly buildings are much better for the health of the people who work and live in them, as well as for the Earth.

Key words: healthy buildings, green building, environmentally-friendly buildings, people's health, healthier effects

There can be little doubt that a huge progress has been made since the 1970s in improving the understanding of the construction and design practices that produce healthy buildings from the point of the impacts of buildings on occupants' well-being and health. First introduced by Levin in 1995 a broader definition of "healthy buildings," included not only the impacts of buildings on their occupants but also on the larger environment [1].

Green buildings are designed for effectively using water, energy, fuel and other resources; reduced environmental degradation and waste pollution; improving employee productivity and protection occupant health [2].

Nowadays there is significant knowledge to design and construct buildings that consume between 10% and 20% of the energy used to operate the average buildings being built today. A few such buildings have been built, and their energy performance has been verified. These more resource-efficient buildings can be more satisfying to their occupants, more comfortable and more productive places of recreation, study or work. These buildings provide their occupants with more control over their local or personal lighting and thermal environment than most buildings being built in the recent past and today. Many of them cost less to

operate and to build. Some of them provide better air quality. They are built with fewer apparent impacts on the natural environment and using materials requiring less consumption of non-renewable resources. These economically and environmental improved buildings can be built using currently available technology [3].

The green building movement began twenty years ago with a simple mission: to contribute stability in construction industries. There are now 0.325 meters of certified green building space available around the world, and explorers in many different countries have been measuring the actions to see if these buildings as “healthy” buildings.

Residents of green buildings are more satisfied with their workspace, the indoor air quality, building cleanliness and maintenance.

The research measured light, internal air quality, the presence of chemicals and noise that might disadvantageously affect health, as well as asking the people who live and work in them about their experience.

The information is serious for future building design because modern people spend 92 percent of their time indoors. To evaluate the effect on well-being and health, the scientists looked at much research that had taken into account factors that affect health − including chemical, radiological, physical and biological aspects of environmental hazards [4].

They looked at ventilation, air quality, filtration, acoustics and lighting, and studied the quality of the canteens, the architecture, the building’s surroundings and access to natural light. Across all green buildings there are fewer cases of sick building syndrome symptoms, with better mental and physical health all round [5].

There is one incontestable fact that rings constantly in our faces: buildings have a lot to do with our internal and external environment, and have a significant impact on both our health and the health of future generations.

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Zyukova K.V.

THE GREEN INFRASTRUCTURE FEATURES IN THE HISTORIC CENTERS OF KAZAKHSTAN

Master's student of the Department of Ecological Monitoring and Forecasting, Ecological Faculty, RUDN University

kseniya30001@gmail.com

Abstract: The issues raised in the article, particularly green infrastructure refurbishment in historic centers, located in arid geographical conditions, are especially relevant at the time of global environmental changes.

Keywords: green building, ecology, cities, parks, complex, citizens, planning, heritage.

Urban traditions of modern Kazakhstan reflect centuries of development and interaction of nomadic culture and settled agricultural lifestyle of the ethnic groups that inhabited Central Asia. They left a distinctive architectural and town-planning

heritage, so conservation and restoration of it remains an important issue with the growing pace of urbanization and globalization.

In addition, there is the problem of ecological state of the cities improvement, which requires complex transformation of undeveloped urban areas such as the formation of the green spaces network and the using of new landscaping forms.

Cities of the Republic of Kazakhstan (many of them are cultural-historical and religious centers of Central Asia) are remarkable for original architecture, while a vast area of the country offers a variety of natural conditions. The most complicated objects are the desert zone cities with low level of urban greening, organized both naturally and artificially.

Taraz and Turkestan are the most problematic cities in terms of planning, because they were formed without taking into account the modern needs of the residents.

Taraz city is one of the oldest in Kazakhstan, built Before the Common Era. There are architectural monuments, numerous Bronze Age burial mounds, rock carvings and remains of medieval buildings and fortifications.

The current of the fan-shaped structure of the city was formed unevenly. In the 7th century BC Taraz was a major link of the Silk Road. Later the town grew uniformly on the West from the city center, the Eastern part is the oldest. The ratio of forests to desert areas is quite high.

This city is a positive example of the modern buildings adaptation to the ancient settlement territory, since the small square remained intact within city limits.

The Karatau ranges are natural barriers for suburban areas domestication. The quantity of fields is reduced from the valley of the Talas river. Agricultural fields in the land use structure occupy a special place because the system of gardening is provided due to their territory, and it is compactly structured. The expansion of cropland in combination with the rational using of agroclimatic, soil resources and strengthening local wedges of

the green network will have a positive impact on the environmental state of Taraz city, which suffers from air pollution.

The structure of Turkestan city land use is fundamentally different from the structure of Taraz despite the similar landscape conditions. Turkestan (formerly Yasi) is located in the foothills of the Karatau ridge and have multipath planning.

The city appeared in the early first century AD, at the intersection of caravan routes. The cultural part of the city was fenced off from the rest of the city area and had the shape of an irregular pentagon. In the Western corner of it the main building of the architectural complex of Khoja Ahmed Yasawi is located . In the process of building the city, this part remained intact as the city was expanding with "rays" and streets were building up evenly. Intradistrict landscaping is extremely insufficient.

The formation of the green infrastructure there requires significant transformations of urban space, so construction and landscaping of large areas is likely to disturb the centuries-old sacred monuments and heritage sites.

The land use over a third of the territory is assigned to unused land and this fact already complicates the formation of a compact greening network. The spurs of the Karatau range not only prevent landscaping suburban areas, but also form more arid climate, a temperate desert with a high degree of continentality. Configuration of agricultural lands is quite specific, they are located along the foothills and in close proximity to small settlements near the the city.

The creation of green areas in cities is complicated by the laboriousness of carrying out the necessary planting and subsequent plant care.

The artificially created gardening system is in conditions of excessive sun exposure, so plants should be placed compactly in a relatively small areas close to housing, commercial and public centers, avenues and alleys along the canals, irrigation ditches, providing shading of the pedestrian linkages between residential

complexes and urban centers of attraction. The lack of developed irrigated agriculture in the cities, which would support an artificially created elements of the network, faces that network itself in the desert zone must be groundbreaking. It would be rationally to use the new forms of landscaping that do not require the conversion of large areas of urban space. For example, the method of "green roofs," which is actively used in Europe, where even small urban areas are used for environmental purposes. An important condition for the green infrastructure formation and development in the historic centres is a complex approach. Capital investment in landscaping makes economic sense, whereas a mitigation against negative impacts of natural phenomena is much more cost-effective than reparation and replenishment of losses with more expensive artificial technological solutions.

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9. LEGAL AND ECONOMIC FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

Efimov D.S.

ENVIRONMENTAL INSURANCE IN RUSSIA: CHALLENGES AND PROSPECT OF DEVELOPMENT

Russia
Master's student, Ecological Faculty
RUDN University, Moscow
efimov.info@gmail.com

Abstract: The paper discusses the problems of environmental insurance development in Russia. The mechanism of regulation of environmental insurance in Russia is considered. The article analyzes attempts to improve the environmental insurance system in Russia at the level of legislative and executive authorities.

Key words: environmental insurance, emergency situations, legislation of Russia, voluntary and mandatory insurance, Russian Far East.

The elimination of the damage caused by emergency situations requires huge costs worldwide. The confrontation of ecology and economy nowadays is one of the key national issues in Russia. Modern status of the environment in the country can be described as a crisis, not only because of the accidents caused by intensive anthropogenic pollution, but also because of the impact of various natural disasters.

Not only administrative and legal measures should be used to prevent such damages, but also such a compensatory measure, as insurance can work. It should be noted, that the institute of environmental insurance has not received sufficient development in Russia yet, but such a measure can become an influential factor affecting the state of affairs in the field of combating the negative impact on the environment.

Environmental insurance is defined as the activities carried out at the expense of special insurance fund to protect the

property interests of individuals and legal entities, municipalities and the state from the environmental risks [3]. Russian insurance is generally regulated by the law "On the organization of insurance business in the Russian Federation" [1] and by the Federal Law "On Environmental Protection", which laid the foundations for the development of national environmental insurance [2]. With this expanded protection of the population from the negative consequences of emergencies, the environmental insurance system should work properly and efficiently. However, as already noted, in practice they often depart from the principles of economically justified compensation for environmental damage to victims of various disasters. Modern concepts and legislation about types and value of environmental insurance fund are not fully optimized. Insufficient financial protection of population and companies is the result of ineffective methods of compensation for material damage.

In the end of July 2013, the south of the Russian Far East turned out to a catastrophic flooding that resulted in a consistent increase of the water level in the Amur River. At the peak of the flood, the water flow in the Amur exceeded the norm almost two and a half times. Flood of this magnitude has occurred for the first 115 years of observations [7]. The region has suffered enormous damage. In October 2013, the approximate damage from the floods in the Far East was estimated at more than 40 billion rubles. [6]. According to a survey of buildings in a flood zone, the restoration of more than 12 thousand of residential houses and apartments was impossible. That means that flood made 20% of homes in the region uninhabitable [5; 6]. The recovery of the housing stock after the damage of this magnitude requires enormous investments. The funds allocated by the state to the compensation is not enough. In this regard, increasing size of payments or introducing control mechanisms were essential. To some extent, this issue could be resolved by a property insurance.

The catastrophic flooding in the Far East with its large-scale consequences resumed discussion on insurance again, as it was known that the damages caused by the elements, as usual, are almost entirely the responsibility of the state, while the share of insurers would not be as large (less than 10% of assets and 9% of the sown fields [8]). So, it should be noted now, that mainly, the list of risks, which are covered by the standard contract of property insurance, contains natural disasters, including floods.

The rational use of such compensatory measures, such as insurance, and, in particular, environmental insurance, the state would not have to spend a large amount of financial and other resources for the elimination of environmental damage caused by disasters and other emergencies. In this regard, in the nearest future some relevant measures may become efficient, for example, transition from the state compensation payments to the payment of insurance companies (in cases where the lost property was insured). A fixed percentage of payments to victims of the disaster, the amount of which shall be determined based on the analysis of the factors of natural and man-made risks to life and health in emergencies can also become an effective method (for fixing it in the legal document) in development of national insurance. The changes would be advisable to introduce a mechanism to increase the accumulative part of pensions (while maintaining this type of payments) and tax deduction method for citizens who voluntarily insure their homes [4]. Rate property valuation should be offered to the market. There should not be a specific set of property valuation by government. So, to create mass housing security system in the country motivation should be developed. There is a need for raising environmental and legal culture of citizens.

The formulated proposals for the improving the efficiency of modernization of the national system of environmental insurance are based on the analysis of natural and anthropogenic factors of risks to life and health of population in emergency situations in the various regions of the Russian Federation.

It attempts to change the status of environmental insurance in the country including the desire to attract more money insurers to eliminate the disaster loss that is directly linked with the discussion on the introduction of mass home insurance. As noted above, the population in the country avoids this procedure. In this regard, it is currently an important task to promote the insurance, in particular the ecological one. Finally, that is important to convey to residents a personal concern for the insurance of their property, and not to depend on the state with the next disaster comes to them for help.

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Morozova E.D.

THE DYNAMICS OF ENVIRONMENTAL CRIMES FROM 2003 TO 2013

Russia,
Bachelor's student, Ecological Faculty,
RUDN University
candyfruit@mail.ru

Abstract: The article is analyzed the number of registered environmental crimes in ten years. There are considered the basic problems and causes of the imperfection of environmental legislation.

Key words: environmental safety, analysis offenses, resource potential, Administrative Violations Code of the Russian Federation, Criminal Code of the Russian Federation, legal liability system.

Introduction. Environmental crime is one of the most socially dangerous and widespread types illegal acts. Nowadays there are different types of responsibility for violation of environmental legislation, such as the Administrative Violations Code of the Russian Federation and the Criminal Code of the Russian Federation.

Methodology. Environmental crime is a mass social and legal phenomenon, which is expressed in the aggregate environmental crimes encroaching on the field of environmental protection in relations of environmental safety, environmental rights of citizens protected by the Constitution of the Russian Federation, or capable of mischief to the environment and human health [1, p. 755]. One of the most important indicators used by

experts to describe the crime as a negative social and legal phenomenon, it is a state determined by the absolute number of crimes in a certain area for a certain time.

Table № 1. The number of registered environmental crimes

	2003	2004	2005	2006	2007	2008
Environmental crimes	26097	30573	33491	41881	41242	44883
From them are the most distinguished:						
water pollution	19	12	26	38	32	28
illegal hunting	759	782	1083	1397	1292	1186
illegal cutting of forest range	12052	13475	14641	16281	19128	23802
destruction or damage the forest range	2021	2331	2320	4386	2487	3824
	2009	2010	2011	2012		2013
Environmental crimes	46607	39155	29151	27583		24743
From them are the most distinguished:						
water pollution	19	19	17	15		13
illegal hunting	1560	1540	1517	1613		1640
illegal cutting of forest range	24932	20826	16077	15795		14640
destruction or damage the forest range	2461	2925	2393	1753		861

The table №1 shows the number of registered environmental crimes on the basis of the Russian Ministry of the Interior statistics [2]. Statistical Yearbook provides information about the number of registered environmental crimes from 2003

to 2013. The yearbook is published once every two years [3, p. 78].

These data indicate the preferential use of those articles of the Criminal Code, which protect the resource potential of the country, including illegal hunting, illegal cutting of forest range.

Articles, such as water pollution, are used much less frequently.

The number of crimes that caused it is less than 1%.

Analysis of the environmental crime and the fight against it shows that, despite some successes of law enforcement bodies, the ecological direction in general was not yet a priority for law enforcement.

A significant part of environmental offenses are neglected and they turn into a crime. Or on the environmental crimes the police often do not react or underreact.

The main reason for the stable growth of environmental crime is a social and economic situation in the Russian Federation. In conditions when the most of the manufacture is stopped, frequently fishing, hunting, timber trade are almost the only source of livelihood for many people.

Conclusion**.** In the fight against environmental crimes, is important be constantly aware that they create a real threat to the biological bases of life, health and human development.

Today, the legal liability system provides soft legal penalties for environmental offenses. Therefore it is necessary to increase fines and toughen criminal liability for environmental offenses.

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Nikolaeva Y.A.

THE ANALYSIS OF A REGULATORY FRAMEWORK OF PRODUCTION AND CONSUMER WASTE IN THE RUSSIAN FEDERATION UPON THE OPPORTUNITY OF REALIZATION OF FORECASTS ON THE INCREASE OF VOLUME OF WASTE RECYCLING AND ON THE ELIMINATION OF WASTE POLLUTION OF LANDS

Russia
Master's student, Ecological Faculty
RUDN University, Moscow
Yuniko818@mail.ru

Abstract: The Ministry of Natural Resources and Environmental Protection of the Russian Federation predicts that till 2020 the volume of waste recycling will triple in Russia and the pollution of lands by waste as a result of dumps and illegal grounds has to be completely eliminated by 2030. For realization of these forecasts amendments to the Federal law of 24.06.1998 No. 89-FZ "About production and consumer waste" have been introduced, offering measures of economic incentives of production of biodegradable goods and packaging materials, alongside with the decisions providing liability of the producer of goods and its importer for waste recycling which are formed as a result of consumption of goods are made.

Key words: production and consumer waste, waste treatment, wastes in Russia, solid municipal wastes (SMW), biodegradable goods and packaging materials, regulatory framework of production and consumer waste treatment.

The problem of production and consumer waste treatment is acute for many countries as any human activity is accompanied by waste formation. Moreover, the amount of the household waste increases annually, the structure of waste changes upwards to share of packaging materials which are characterized by the increased resistance to decomposition in the nature conditions.

In Russia about 70 million tons of solid domestic waste are formed annually, and only 7 million tons of them come back to

economic circulation, which is only 10%. Other part of waste is not exposed to any kind of utilization, that is why there is a problem of excessive accumulation of waste.

In 2016 the Ministry of Natural Resources and Environmental Protection of the Russian Federation has released two forecasts: "Till 2020 the volume of waste recycling will triple in Russia" and "By 2030 in the Russian Federation pollution of lands by waste as a result of dumps and illegal grounds has to be completely eliminated".

It can be noticed that these forecasts have a cause-and-effect relationship. Obviously, an expected result of these conclusions could be a reduction of volume of burial waste and a risk reduction of formation of unauthorized dumping grounds with a complete elimination of a possibility of land and soil pollution.

Having analyzed present changes in a regulatory framework of production and consumer waste in Russia, we can conclude that today there exist several prerequisites leading to possible realization of these forecasts in Russia.

Firstly, considerable changes concerned the Federal law of 24.06.1998 No. 89-FZ "About production and consumer waste": there was a new type of utility - the solid municipal waste treatment (SMW) which presents the waste formed in premises in the process of consumption by private individual, and also goods which lost the consumer properties in the course of their use by private individual for meeting their needs. Now solid domestic waste turns into category of solid municipal one.

Besides, since January 1, 2016 according to No. 89-FZ of 24.06.1998 the area of the solid municipal waste treatment is legislatively settled: the main management functions of waste flows are transferred to the regional authorities, which can choose regional operators for ensuring export of waste from residential sector and their direction to specialized objects for treatment. Involvement of waste in turnover will be promoted by the territorial schemes provided by the law for regions. They will

include all chain of waste data: a source of generation, a quantity (with types and classes of danger), places of handling, utilization, neutralization and placement.

As a result, the Ministry of Natural Resources and Environmental Protection of the Russian Federation assumes to remove control of actions of the regional authorities and execution of territorial schemes out of Federal Service for Supervision of Natural Resource Usage and to expand it into space and aviation monitoring, active interaction with citizens and public organizations.

According to the Minister of Natural Resources and Environmental Protection of the Russian Federation Sergey Donskoy, these innovations not only make service transparent, but also will allow to resolve an issue with the organization of waste export from private residential sector that should lead to reduction of unauthorized dumps formation.

Secondly, they have imposed measures of economic incentives of goods and packaging production which waste will be provided by biodegradable materials. These measures are provided by tax benefits, privileges on payment for negative impact on the environment in case of waste placement and payment of ecological dues.

Thirdly, in 2015-2016 the decisions providing liability of goods producer and its importer for waste recycling which are formed as a result of goods consumption were made. According to them producers and importers of goods now have the right to choose: to utilize waste independently or to pay ecological dues.

Thus, it is possible to conclude that the state plans to reach an increase of volumes of waste conversion and a complete liquidation of unauthorized grounds and dumps by stimulation of waste conversion by the entities, creation of new refinery capacities and promoting of new ecological business in the field of utilization.

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Tijerina-Borisenko Jim-Rus[1], Borisenko Elena[2], Tijerina-Borisenko Janet[3],

MÉXICO: RIESGOS Y COSTOS EN LA PRODUCCIÓN DE PETRÓLEO DEL GOLFO DE MÉXICO

[1]Estudiante de Magisterio, Facultad de Ingeniería, RUDN University
Profesora de Centro de Enseñanza de Lenguas Extranjeras,
Villahermosa City, Tabasco, México
Máster en Ecología y Gestión de Recursos Naturales,
[3]Estudiante de Doctorado,Facultad de Ecología, RUDN University
jim_rus_1@hotmail.com [1] lienabor@hotmail.com [2]
larusa12@hotmail.com [3]

MEXICO: RISKS AND COSTS IN OIL PRODUCTION IN THE GULF OF MEXICO

Abstract: This article presents the state of the exploitation of oil basin in the Gulf of Mexico in the Mexican territory.

Keywords: economy, Mexico, oil, Gulf of Mexico, ecology.

Resumen: este artículo muestra el estado en cual se encuentra la explotación de la cuenca petrolífera del Golfo de México en el territorio mexicano.

Palabras clave: economía, México, petróleo, golfo de México, ecología.

Introducción: El subsuelo del Golfo de México es muy rico en petróleo y gas pero la explotación y exploración allí tiene sus peligros. El propósito de esta investigación es determinar los riesgos específicos y los costos de los derrames en la explotación petrolera de la cuenca para México. Se usó el siguiente método:

la investigación no-experimental de triangulación de toda la información teórica y empírica analizada.

Como resultado de la investigación fue determinado que el proceso de desplazamiento de sal y la presión anormalmente alta en ciertos yacimientos de aguas profundas provocan accidentes y desastres ambientales en estas aguas [1]. En caso de un derrame de petróleo se establece el monto de la indemnización. La cantidad de daño como resultado del accidente puede consistir en los siguientes componentes: las pérdidas de las ganancias pesqueras; las pérdidas de las ganancias de los hoteles como consecuencia del su cierre; los costos de la localización de las manchas de aceite; los costos de recolección de aceite; el costo de la protección del mundo animal; el costo de la recuperación de los sistemas técnicos [2].

En México la empresa petrolera Pemex, que es la organización gubernamental, en su actividad petrolifera se rige por la idea de no "destruir todo de paso" durante la explotación de la cuenca petrolífera. Uno de sus labores es elevar el nivel de vida de su población, mientras que se esfuerza por mejorar la seguridad en la producción y refinación, y la protección del medio ambiente [3]. Ya que el Golfo de México es una zona de mucho valor para el país y patrimonio de México, una de las actividades principales de Pemex es prevenir accidentes y tener la exploración y explotación del Golfo lo más seguro posible cuidando la ecología de la cuenca.

En conclusión: Alta y ultra alta energía del subsuelo, los yacimientos de alta presión, altas temperaturas que crecen con el aumento de la profundidad, y otros indicadores, al mismo tiempo, cada vez más inestables y poco predecibles a la mayor profundidad, actividad y movilidad de los hidrocarburos y otros sistemas móviles, las formaciones de sal de gran escala – todo esto hace que la cuenca sea un lugar de lo más prometedor para los trabajos de búsqueda y producción de petróleo y a la vez más peligroso. Con todo eso la explotación del Golfo rico en petróleo y gas debe ser segura de lo más posible.

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10. ECOLOGY, POLITICS AND SOCIETY

Borisenko E.V.[1], Tijerina-Borisenko Janet [3], Tijerina-Borisenko Jim-Rus [4]

LA POLÍTICA ECONOMICA EN MÉXICO EN EL ÁMBITO DE LA NANOTECNOLOGÍA

[1]Profesora de Centro de Enseñanza de Lenguas Extranjeras, Villahermosa City, Tabasco, México
[2]Estudiante de Doctorado,Facultad de Ecología, RUDN University
[3]Máster en Ecología y Estudiante de Magisterio, Facultad de Ingeniería, RUDN University
jim_rus_1@hotmail.com [1] lienabor@hotmail.com [2]
larusa12@hotmail.com [3]

THE POLICY OF THE ECONOMY IN MEXICO ABOUT THE NANOTECHNOLOGY

Abstract*: this article presents the state of the Mexican economy in the field of nanotechnology and its use in energy sector.*
Keywords*: economy, Mexico, nanotechnology, oil, ecology.*
Resumen*: este artículo muestra el estado de la economía mexicana en el campo de la nanotecnología y su uso en sector energético.*
Palabras clave*: economía, México, nanotecnología, petróleo, ecología.*

En México, como país capitalista, la Política de Ciencia y Tecnología forma parte de la transición del conocimiento a la economía. La economía del conocimiento es la economía en la cual los factores de conocimiento se convierten conscientemente en más importantes que el capital o los factores de trabajo, y donde, además, la cantidad y la sofisticación del conocimiento impregnan actividades sociales y económicas, llegando a niveles muy altos. La política mexicana respecto a la nanotecnología refleja los objetivos y la dinámica contenidos en la Política de Ciencia y Tecnología, como la búsqueda de la competitividad y la cadena industrial que conducen a la mejora de los beneficios comerciales del país.

El interés en el desarrollo de la nanotecnología en México se expresa en el Programa Especial de Ciencia y Tecnología (PECYT) desde el año 2001 [1, p.17-53], en el cual la nanotecnología aparece como una estrategia de tecnología que tiene un potencial significativo para el desarrollo del país. Este programa se lleva a cabo a través de las investigaciones y la infraestructura del Instituto Mexicano del Petróleo (IMP) que cuenta con los laboratorios de microscopía y la tecnología de nueva generación. En sector energético del país IMP centra su atención en nanotecnología a través de su conexión directa con Pemex que es la empresa gubernamental de petróleo y gas de México [2, p.40-120].

Pemex lleva a cabo la política medioambiental en sus actividades y es una empresa eficaz que busca constantemente mejorar. Esta empresa se destaca por sus esfuerzos y el compromiso de sus empleados en el ámbito de la seguridad, la salud y la protección de la naturaleza [3,p.15-39].

Pemex, como organización gubernamental con un producto importante para la economía, está sujeto a diferentes leyes y normas que regulan la industria petrolera en el país, cuenta con la red interna de la información para el uso de su personal. El Marco Normativo se actualiza periódicamente [4,p.27-50]. Es importante señalar que las normas actualizadas ayudan a orientar y llevar a cabo una línea de control desde una posición de la utilización de las normas modernas y las mejores prácticas en la industria para cumplir las leyes en esta área [5].

Cuando a las inversiones de Pemex en el campo de la nanotecnología aplicada para el sector del petróleo y el gas – son los estudios en varios frentes para abordar los diversos problemas de la empresa.

Aliarse con otros países en colaboración en campo de nanotecnología da al México el desarrollo y uso de la nanotecnología de manera más rentable.

En conclusión: como la nanotecnología promete ser la próxima revolución industrial, los países que no están en

condiciones de estar a la altura podrán ser excluidos de la nueva redistribución industrial como consecuencia de la competencia, además, la economía mundial se basa cada vez más en el conocimiento y la innovación tecnológica, que representa una desventaja para aquellos países que no invierten en la educación y el conocimiento – en este contexto, la nanotecnología para México no es una opción, sino un compromiso para el desarrollo del país.

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Dalidenok A.D.[1], Kurbatova A.I.[2]

CLIMATE CHANGE AND COSEQUENCES OF THE MAIN GLOBAL PROBLEMS IN INDIA

[1]*Bachelor's student, Ecological Faculty, RUDN University, Moscow*
anutaluchshaya@rambler.ru
[2] *Candidate of Biological Sciences, Associate Professor, Ecological Faculty, RUDN University, Moscow* **kurbatova_ai@mail.ru**

Abstract: This article describes the following theses: international aspect of Indian environmental problems; Indian contribution to global climate change; measures of decrease of this influence.

Key words: India, emission of carbon dioxide, ecological problems of developing countries, coal power plants, global climate change.

The problem of global climate change is one of the most important nowadays. The significant contribution to aggravation of this problem has made India.

India occupies the 4th place in the ranking of countries in volume of the carbon dioxide emissions, behind only China, the United States of America and countries of the European Union [2]. The first graph shows how volume of the carbon dioxide emissions changed in the period from 1969 to 2013 in India.

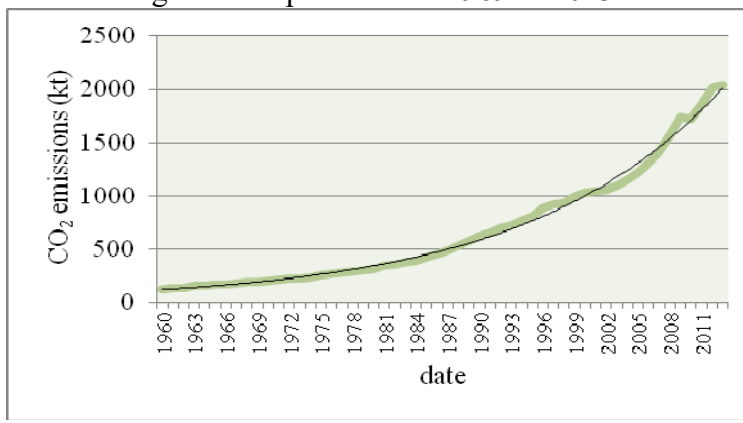

Fig. 1 Dynamics of volume of the CO_2 emissions (kt) in India for 1960-2013 yy [4]

In generally you could say that increase of volume of the carbon dioxide emissions in India obeys an exponential law. Last decade only one year noted the light decrease of volume of the carbon dioxide emissions compared previous year. In 2010 volume of the carbon dioxide emissions decreased by one per cent compared 2009. This slight progress should attributed to the fact that 2008 became turning-year for Indian attitude to the problem of global climate change. Exactly in this time national Indian plan to combat against global climate change was originated [2]. However the increase of volume of the carbon dioxide emissions is continuing. And probably this tendency will keep up, because 455 new coal power plants were built in India soon [1].

A country's economy is based on consumption of coal as an energy source. 63 per cent energy consumption is provided by coal [1]. The thermal power plants, that built in the 1970-1980's are obsoleted technologically and they generate 50-100 times more carbon dioxide than the European power plants. This factor, coupled with the constant increase the number of consumers of energy, and poor quality of Indian coal, explain the rapid increase in carbon dioxide emissions in the country [2].

India as a one of the main emitters of carbon dioxide experiences political pressure from global community.

The international community is trying to attract India to reduce carbon dioxide emissions by signing legal obligations. However Indian side refuses to deal with any agreement because they produce carbon emissions less than USA, Gulf countries, European Union, China and many other countries if considered in per capita [2]. The second graph shows that developed countries produce ten times more carbon dioxide per capita, if compere with India. Because of that it is correct to direct international requirements of reduction emissions to developed countries firstly, and not to India.

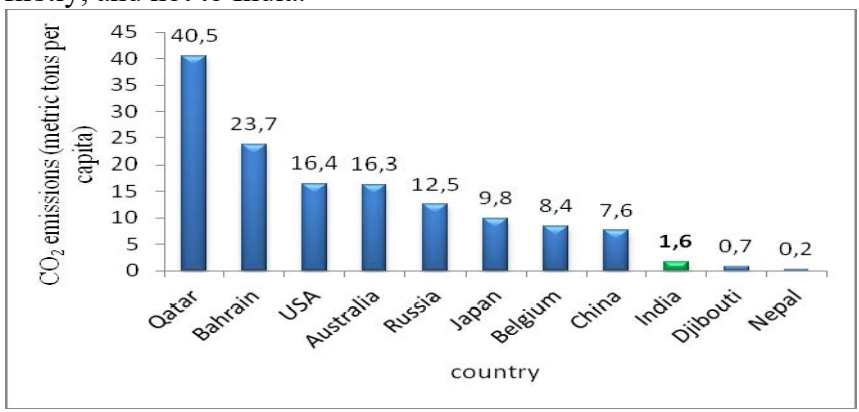

Fig 2 CO_2 emission in different country (metric tons per capita) in 2013[5]

Indian State power declares their willingness to carry out the required policies at the national level because of air pollution and climate change threaten to India.

There are some consequences relating to India because of global warming: low yield, aggravation of the problem of fresh water, deterioration of relationship with neighboring countries, increasing the number of poor people, the flooding of large areas near the ocean due to sea level rise.

And there are some aspects in the implementation of the plan to combat against global climate change [2].

The first one is development of alternative energy sources such as solar and wind power. In 2003 Indian parliament adopted a law called The Electricity Act. Owing to it realm of renewable energy became inviting to private investors. Indian Renewable Energy Development Agency – IREDA is working under the auspices of Ministry of new and renewable energy. This Agency provides financial support to projects for renewable energy, giving long-term loans on beneficial terms [3].

The second one is improving energy efficiency. There is the Bureau of Energy Efficiency in India, which was established with the aim of introduction of energy standards, labeling equipment, conducting energy audits, etc.

No doubt that India is interested in the improvement environmental quality, but it will take a lot of time and necessary measures will be implemented before India will be able to compare to environmental quality with developed countries. According to experts of World Bank 0,02-0,4 per cent of Gross-National Income is enough to realize green development in India. The same minimum cost will allow keeping up high rates of economic growth in India without harming the environment [2].

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Lifanova R.Z. [1]***, Orlova V.S.*** [2]

EFFECTS OF ELECTROMAGNETIC RADIATION OF EXTREMLY HIGH FREQUENCY IN THE BACTERICIDAL ACTIVITY OF BLOOD SERUM

[1]*Postgraduate student of the Department of System Ecology, Ecological Faculty, RUDN University, Moscow*

torazo-414@mail.ru

[2]*Doctor of Biological Sciences, Professor of the Department of System Ecology, Ecological Faculty, RUDN University, Moscow*

Abstract: Today the electromagnetic radiation (EMR) of extremely high frequency (EHF) is widely used in medicine. The effect of intravenous infusion of saline solution exposed to EMR EHF to the rats' blood serum bactericidal activity has been studied. It was found an increase BABS in rats of experimental groups, it proves a stimulatory effect on nonspecific resistance of rats.

Key words: electromagnetic radiation of extremely high frequencies, bactericidal activity of blood serum, nonspecific resistance, intravenous injection, Aist - 7,1

Among the many environmental factors that cause significant changes in the functional state of biological systems at various levels of organization, a special role belongs to the electromagnetic radiation (EMR).

The natural electromagnetic background in the biosphere is determined by solar radiation, cosmic bodies, as well as the emission of the Earth's atmosphere.

An important area of use of EMR EHF is agriculture. To date, there is evidence that the use of EHF EMR in various spheres of human activity cost-effectively.

The impact of EMR EHF type "white noise" causes an increase in the protective properties of white mice and white rats to the effects of pesticides [1].

It was found that the physiological effects of EHF EMR on nitric oxide system longer than a NO donor [2].

The aim of our research was to study the influence of EHF EMR on the bactericidal activity of blood serum (BABS) of white rats.

Materials and methods.

Investigation of the influence of EHF EMR on BABS conducted on white rats of both sexes weighing 250-300 g. Rats were divided into 2 groups (n = 5).

Rats of control group were injected intravenously with saline at a dose of 1 ml / 100 g bodyweight. The rats of the experimental group were administered saline exposed EHF electromagnetic radiation at the same dose.

BABS was determined in relation to St. aureus.

Generator of EMR UHF was device "Aist - 7,1". For the irradiation we used three types of waveguides: conical (horn 20 mm in diameter); round (horn 8 mm diameter); rectangular (waveguide section 5.2 x 2.6 mm, which provides power less than

1 mW, but not less than 0.5 mW). Impact on saline is carried by conical waveguide in mode of continuous session at a distance of 10 cm for 30 minutes.

The statistical data processing was carried out by Student's test.

Results of the research.

It found an increase of BABS after one hour after intravenous injection of solutions in the control group is 1.2 times and in the experimental group is 1.7 times ($p<0,01$ relative to the baseline values). In the control group of rats at 24 hours BASK returns to the initial value, in the experimental group of rats BABS remains increased in 2.1 times. ($p <0,01$). Return of the test parameter to the initial level is observed after 48 hours.

BABS after one hour after intravenous injection of irradiated saline solution was 63,2 ± 3,28%, that is 1.7 times ($p <0,01$) higher than the control group.

Conclusions: saline solution after influence of EHF EMR has a stimulatory effect on nonspecific resistance of rats.

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Nguyen T.H.[1], Tchernychov V.I.[2]

AGRICULTURAL WASTE MANAGEMENT AS A WAY TO SUSTAINABLE DEVELOPMENT IN VIETNAM

Vietnam, Russia
[1]Master's student, Ecological Faculty
hieugeo@mail.ru
[2]Doctor of Biological Sciences, Professor, Ecological Faculty
RUDN University, Moscow
vtchernyshov@mail.ru

Abstract: An approach to the treatment of agricultural waste as our great resource for sustainable development is considered. A model of waste management, in which waste is classified by its nutrient content and treated by appropriate ways to get higher value products is described.

Key words: sustainable development, agricultural waste management, organic waste treatment, livestock feeding, silage, Hermetia Illuscens, Perionyx Excavatus, lactic acid bacteria, biochar, vermicompost.

There are a lot of options available to us in the treatment of solid waste. One of the most problematic and dangerous ways in our view is to dig a hole and bury it. Land, which is occupied by such landfills, is so far not suitable for agriculture or for construction. Furthermore, despite all the filtration and purification systems the soil and the atmosphere are still exposed to harmful substances.

Developing countries in Asia, including Vietnam, are characterized by high demographic tension and human pressure overall. According to the theory of the Kuznets curve and research results of Chernyshev V.I., Nguyen Vu Hoang Phuong [1], the necessary level of GDP per capita to improve the environmental well-being in Vietnam is estimated at 15-18 thousand dollars a year. But today it is only 2 thousand dollars a year. Thus, the GDP per capita of Vietnam is still rather far from the minimum value of the switching threshold to make significant progress in struggle against pollution and improve the environmental quality. Is the pollution inevitable at the early stages of economic growth? Is it worth for people waiting and suffering as long as the level of GDP does not reach a necessary level?

In our opinion, at this stage of human development, we have quite a lot of available knowledge and technologies in order to optimize our life with nature, the most important is how to organize them on the appropriate way. In this paper we propose an approach to the treatment of agriculture waste as a resource for improving the life quality of a large part of the population, who are now living in the countryside and occupy the farm.

First, we propose the following model of waste separation, in which waste is classified by its nutrient content, and in this approach, we have some appropriate ways of their recycling and processing into higher value products:

№	Class of waste	Treatment	Products
1	Waste with a high level of nutrition content	Making silage	Livestock feed
2	Waste with a medium value of nutrition content	Bioconversion by black soldier fly (Hermetia Iluscens) and worm (Perionyx Excavatus)	Livestock feed, feed for aquaculture / organic fertilizer
3	Waste with a low level of nutrition content	Bioconversion by microorganisms (composting)	Organic fertilizer / amendments to improve soil properties
4	Waste with a very low level of nutrition content	Biomass gasification	Energy / amendments to improve soil properties

The waste in the first and the second class is high degradable as compared with the third and fourth class. For example, waste of the first class is food scraps, waste in food processing, spoiled vegetables and fruits. The traditional way of their disposal, saving their nutrition value, is making silage, involving lactic bacteria.

"Lactic acid bacteria" (LAB) refer to a large group of bacteria, rather than a single species or strain, that produce lactic acid as a by-product of digesting their food source (usually carbohydrates). The lactic acid accumulates to ferment or "pickle" the food, and LAB are capable of surviving in acidic (low-pH) environments [2]. Silage products have a lot of advantages when feeding livestock: improve digestion, prevent the development of pathogenic bacteria in the digestive tract, increasing the feed conversion ratio. So, silage involving lactic bacteria is considered as a natural antibiotic [3].

The second class of waste includes excrement, manure, and waste in the 1-st class, which is decaying. This kind of waste is not suitable for feeding livestock. We can treat them using black soldier fly larvae Hermetia Iluscens and worm Perionyx Excavatus. This integrated treatment system is one of the most effective bioconversion on Earth. Fly larvae Hermetia Iluscens digest rotting materials that worms Perionyx Excavatus can not digest. In their turn, the worms can digest the remaining waste that fly larvae do not prefer.

In nature, the fly larvae is considered as "a natural sweeper". They can digest up to 40 kg of organic waste in the area of $1m^2$ per day [4]. They can digest many kinds of waste that is not suitable for livestock. These larvae are a delicious food for other animals. Thus, they converse waste to the product with a higher nutrition value for feeding not only livestock, but also aquacultural livings (as fish, shrimp, etc.).

The remainder of the waste which is not processed by fly larvae, is digested by worms. The final product after processing is just vermicompost – an organic fertilizer. Vermicompost provides higher crop productivity (about 30-40%) as compared to the current chemical fertilizers [5]. In addition, the worms themselves are also a good source of protein for livestock feeding.

The third class of waste includes leaves, straw, a soft part of the crop. We can compost them and the products are an organic fertilizer or amendments to improve soil properties. Waste in the last class has the lowest nutrition value, and so hard to decompose, as rice hulls, for example. For this kind of waste, the biomass gasification is suggested. While we have thermal energy, we also have biochar as an additional product. Biochar can improve the physical properties of soil, while it fixes nutrients and soil moisture [6]. Some studies in Cambodia proved that using biochar increases the crop yeild by 300% [7].

Thus, our approach provides a full treatment strategy related to agriculture waste. This approach is based on the

naturally occurring biological processes, which is a precondition for the sustainable development with respecting the nature laws.

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Paukova A.A.[1], Mikhaylichenko K.Yu.[2]

SPECIAL ASSESSMENT OF LABOR CONDITIONS

Russia,
[1]Bachelor's student of the Faculty of Ecology
RUDN University, Moscow
paualeksandra@yandex.ru
[2]Candidate of Biological Sciences, Assos. Professor, Ecological Faculty, RUDN University, Moscow
ksecofak@yandex.ru

Abstract: Special assessment of labor conditions takes place of the assessment of workplaces in 2014 and has many advantages. There are several classes of danger.

Key words: special assessment of labor conditions, the Federal Law, dangerous factors, consequences of not passing the assessment.

SALC, or special assessment of labor conditions, is a complex of measures that are realized in several phases and identify harmful and/or dangerous production factors. SALC also helps to find out how do these factors influence people's health.

The results of the special assessment effect:

- Accrual of insurance contributions
- Guarantees and compensations definition
- Planning and realization of different labor protection measures

The Federal Law "About the special assessment of labor conditions".

On the 1st of January in 2014 the Federal Law "About the special assessment of labor conditions" started to operate and the SALC took place of the assessment of workplaces.

Experts suppose, that the main advantage of the SALC is reducing the burden on employers with normal working conditions. On the other hand, owners of "harmful" or "dangerous" workplaces have more tough conditions and requirements, due to the changes.

The order of the SALC.

Every company, accept those who work distance, at home or not officially, needs to assess their workplaces.

This procedure is carried out by at least 5 experts. Moreover, one of them has to be a graduated specialist in the field of hygiene. The order of the special assessment is [1, p. 2]:

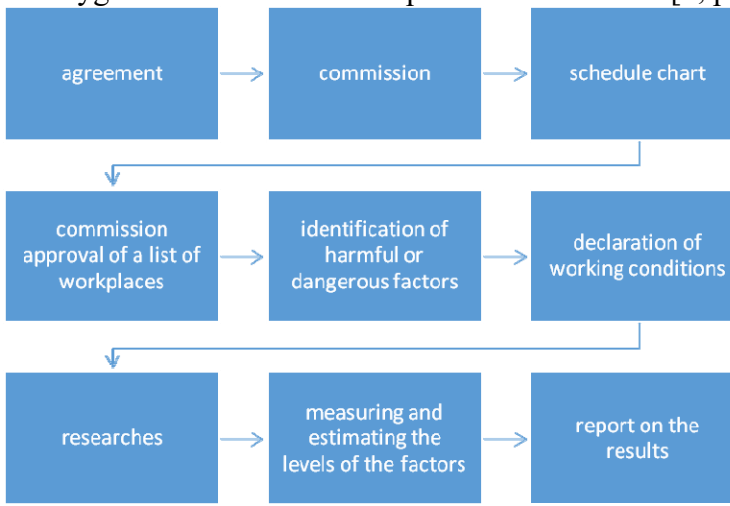

Table 1. The order of the special assessment.

The working conditions are assigned a certain class of danger, depending on the harmful factors that were identified. There are 4 classes of danger [2, p.2]:

Table 2. 4 classes of danger.

Class of danger	Characteristic
1	Optimal working conditions
2	Permissible working conditions
3	Harmful working conditions
4	Extreme working conditions

Harmful working conditions are classified by exceeding hygienic norms into 4 rates [3, p.3]:

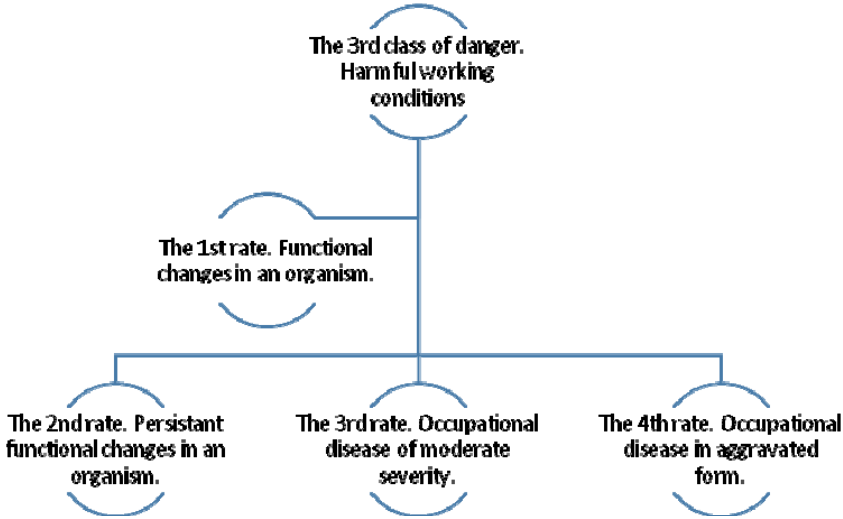

Table 3. Classification of harmful working conditions.

What are the consequences of not passing the SALC?

There are several variants of punishments for not passing the special assessment:

- From 5 to 10 thousand rubles for executive
- From 60 to 80 thousand rubles for organizations

For the second time an executive or an organization do not pass the special assessment, the financial punishment is tougher:

- From 30 to 50 thousand rubles for executive
- From 100 to 200 thousand ruble for organizations

To make a conclusion, avoiding passing the special assessment is not a good idea: the risks, that are appearing are very high.

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Salikhov M.K.

SISTEMA DE GESTIÓN AMBIENTAL EFICAZ A BASE DE LA POLÍTICA DE LA S.A. "ATOMENERGOMASH"

Rusia
Estudiante de Magisterio (segundo año), Instituto de la Tecnología Espacial, Universidad de la Amistad de los Pueblos de Rusia, Moscú
Mago912@mail.ru

Resumen: El artículo estudia la eficacia del sistema de gestión ambiental y de ingeniería nuclear de la empresa líder – S.A. "Atomenergomash". La sociedad anónima "Atomenergomash" es una división de construcción de maquinaria de la Empresa Estatal "Rosatom", especializada en la fabricación de equipo clave para las indústrias de energía nuclear y térmica, la construcción naval, gas y petroquímica. La S.A. "Atomenergomash" está trabajando constantemente con los retos que plantea el medio ambiente y logra resultados visibles.

Palabras clave: reducción de las emisiones, mejora de la eficiencia energética, gestión ambiental, emisiones de gases de efecto invernadero.

La S.A. "Atomenergomash" es una gran empresa de ingeniería de la energía rusa, parte de la Empresa Estatal para la energía atómica "Rosatom". La compañía agrupa alrededor de 30 de las mayores empresas de fabricación, investigación, ingeniería en Rusia y en el extranjero.

En las plantas de la S.A. "Atomenergomash" se realiza el programa ecológico. Las principales tareas en el camino hacia el desarrollo sostenible son: reducción de las emisiones

contaminantes, lo que reduce el volumen de residuos, la mejora de la eficiencia energética, reduciendo el consumo de agua.

La suma del coste de las medidas preventivas para evitar y minimizar el impacto sobre el medio ambiente, así como sobre el funcionamiento del sistema de gestión ambiental, en el año 2015 fue de 93 millones de rublos. Las empresas que han implantado el sistema de gestión medioambiental ISO 14001 son: la S.A. "SNIIP", la SAP "EMSS". En 2016 se prevé la certificación de la empresa S.A. "AEM-Technología".

La mayor parte de la emisión de contaminantes a la atmósfera pertenece a la SAP "EMSS", la A.S. "OKBM", la SAP "ZiO-Podolsk" y la S.A. "AEM-Technología". Las empresas mancionadas emiten gases de efecto invernadero de dos tipos - el dióxido de carbono (CO2) y el óxido nitroso (N2O), así como otros óxidos de nitrógeno, óxidos de azufre, contaminantes orgánicos persistentes, contaminantes orgánicos volátiles, contaminantes peligrosos del aire, partículas sólidas. En general, la cantidad de emisiones en 2015 hechas por la división se disminuyó en un 26% con respecto al 2014.

La masa de los residuos generados por toda la división se disminuyó en comparación con el año 2014 en un 13%. Alrededor del 85% de los residuos se clasifica como "no peligrosos"; gran parte de estos residuos se produce en las plantas de la SAP "EMSS" y la S.A. "OKBM". La mayor parte de los residuos peligrosos se producen en las plantes de producción principales de la división, o séa, en la S.A. "AEM-Technología", la SAP "ZiO-Podolsk" y la S.A. "OKBM".

En general, 50% de los residuos generados se va a colocar en los vertederos, el 30% están destinados para su reutilización. En la SAP "ZiO-Podolsk" 67,8% de los residuos se utiliza para el aislamiento de los componentes valiosos.

La S.A. "Atomenergomash" está trabajando constantemente para asegurar el uso eficiente de los recursos energéticos. La empresa desarrolla e implementa medidas para reducir los costos de energía y programas de eficiencia energética. El consumo de

energía en el promedio de las principales empresas tiende a disminuir. En 2015, la cantidad total de energía ahorrada ascendió a más de 1 millón de GJ (con respecto a la base de 2009).

En junio del año 2015 la SAP “SGM” ha superado con éxito la segunda supervisión del cumplimiento de la norma internacional ISO 50001: 2011. Durante la misma los expertos no encontraron incumplimentos de las normas al indicar solo las posibles mejoras para ciertas áreas. El programa de eficiencia energética actual se basa en los resultados de las supervisiones energéticas realizadas en las empresas de la S.A. "Atomenergomash" en 2010-2011. Después de las supervisiones energéticas repetidas, que se llevará a cabo en el año 2016, se actualizará el programa. El consumo de energía en el promedio de las principales empresas tiende a disminuir.

Los recursos hídricos apoyan las actividades económicas de las empresas, y también se utilizan en procesos industriales (sistemas de refrigeración/calefacción, al comprobar la presión de estanqueidad de los productos). El consumo medio de agua tiende a disminuir. Durante los últimos tres años (2013, 2014, 2015) la dinámica promedioa de reducción fue del 3%.

Se puede concluir que el sistema de gestión ambiental implantado en las empresas de la S.A. "Atomenergomash" es eficaz, y la empresa se guía por los principios del desarrollo sostenible.

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Zhukov V.V.

STRATEGY FOR ENSURING EFFECTIVE PARTICIPATION OF CITIZENS, PUBLIC ASSOCIATIONS, NON-PROFIT ORGANIZATIONS AND BUSINESS COMMUNITY IN WASTE MANAGEMENT AND ENVIRONMENTAL SAFETY SOLUTIONS

Abstract: Issues related to public environmental control are definitely urgent nowadays. The mechanisms of its realization through institutes of public ecological receptions are discussed, as well as advantages of Courts of Arbitration for dispute resolution concerning environment, environmental protection and waste management.

Key words: public control, public ecological receptions, environmental Court of Arbitration, mediation, environmental safety.

The development of social, economic and socio-political relations in the field of waste management and natural resources management are inextricably linked with an increase in the efficiency of public authorities. At the same time it is necessary to ensure the effective participation of citizens, associations, non-profit organizations and the business community in addressing these issues as a whole. It is advisable to implement this interaction within the organization of a kind of structure of public reception in the field of environmental protection [1].

This structure creates a legal and informational basis for functioning of the operational system of public control in this field, contributing to the state and public institutions engaged in monitoring and law enforcement functions. It will also help concretize legal norms of interaction between civil society and government.

We single out the basic tasks of public reception:

1) To provide a guaranteed direct interaction between the federal center and the residents of the given region to solve the most pressing social and environmental issues in the area of waste management;

2) To assist in the establishment of programs of environmental rehabilitation of territories and the elimination of accumulated environmental damage.

Such interactions will help to prevent the misuse of the public opinion in order to increase social tension, countering various types of manipulation by unscrupulous politicians conscious people for their own selfish purposes.

At the same time an institute of arbitration courts should be formed dedicated to environmental disputes, which we consider to be the best way to resolve disputes in the waste recycling sector [2].

Regional operators have to solve the disputes and conflicts arising between economic entities, public authorities and the public in the field of waste management.

Disputes in the field of ecology are often caused by the bad use of natural resources, development of territories, the production and processing of materials, waste management, transportation and disposal of waste, seizure of land for public needs.

Building companies are harmful to the environment: their activity destroys the fertile layer of the soil on the adjacent land; it destroys the harvest; spoils green areas; litter the territory adjacent to the facility construction.

Oil producers pollute by oil spills; when moving the rig to a new location using powerful tractors (although this technology is prohibited by the legislation on nature protection). In such cases, the arbitration court obliges the defendants to recover at their own expense (and, most importantly, with their technical equipment) all that is amenable to recovery.

Conclusions. The proposed tools provide the opportunity of effective participation of citizens, associations, non-profit organizations and the business community on issues related to environmental management, waste management and their impact on the environment and human health and environmental safety.

The main strategy to solve this problem is to create a functional system of public environmental control, a control of all the elements and processes that occur when handling wastes.

A system of arbitration courts on ecological problems is the most expeditious and effective legal instrument for the settlement of disputes and achieving compromise and competent solutions to problems arising in the formation and functioning of an integrated regional waste management system.

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11. ECOLOGICAL EDUCATION AND TRAINING IN ACTION

Avdonina M.Yu.[1], Valeeva N.G. [2]

ENVIRONMENTAL TERMINOLOGY AT THE PRESENT STAGE

Russia
[1]Candidate of Psychology, Associate Professor,
RUDN University, Moscow
mavdonina@yandex.ru
[2]Candidate of Pedagogical Sciences, Professor,
Head of Department of Foreign Languages of the Ecological faculty,
RUDN University, Moscow

Abstract: Terminology of sciences of Earth has been analyzed. Environmental education of the deciders and of journalists through a right understanding of special term and through their correct use has been discussed. Four sources of enrichment of the term system: language of sciences, vocabulary of official documents, journalistic creations, colloquial units have been compared.

Key words: term system, ecology, neologism, new meaning

Environmental terminology at this stage varies considerably and quickly, following the emergence of environmental problems, the development of theorists solutions and environmental practices, what is of interest to linguists in terms of semantic processes, semantic structure of words and changes in it. The present paper concentrates on four sources of enrichment of the ecological term system.

1. Neologisms denoting new scientific concepts

The first source of neologisms is actually scientific discoveries, leading to nominating new concepts of ecology as a science.

Environmental Science combines and summarizes the data of natural and social sciences, so it term system is being developing and shows itself an open system.

2. New units of language legislation and administrative documents

The second source of environmental vocabulary enrichment are units formed in administrative documents, standards, legislation. This kind of terms includes phrases (often consisting of four or five words) and their abbreviations.

This group of neologisms reflects, above all, the general trend of our time: a kind of "bureaucratization" of science as a whole. Reporting, a scientist must be able to fill all the necessary applications for a grant, to work together with the authorities.

Scientific work in the field of ecology requires coherence of actions of the scientific community and the administration, both at the state level and at the level of local government. As a result, the administrative style is leading, becoming the most important and popular part of the ecological lexicon.

3. Neologisms coming from the media language

The third source of environmental lexicon enrichment is journalism, media language, the language of popular science, which creates a capacious and bright nomination that may enter the terminology. We need inform those who know how to speak convincingly.

4. Neologism formed in informal communication

The fourth source of enrichment of the studied lexical composition is the vernacular speech on environmental issues. We are studying words in the Internet, where units of conversational style and jargon are regularly used.

Discussion and Conclusions.

The search for new environmental terms, the development of their definitions in the intradepartmental, interdepartmental and corporate discussions together with the new opportunities to make changes in a vocabulary online, as well as an unlimited amount of dictionaries, help the appearance of neologisms.

Concepts of English-speaking, francophone and Russian cultures, multinational in nature, have evolved at different historical periods and in different ways. Russian equivalents not

yet meet the requirements of conciseness. This explains the fact that monolingual dictionaries of Russian eco-language show an approach to the selection of units which does not correlate with the English and French ones.

Analysis of lexicographical sources permits to classify terms based on the following positions:

- The criterion of accuracy and subtlety of term definitions ;
- The criterion of official recognition of terms;
- The criterion of diachronic semantic development;
- The criterion of change of the term semantic structure;
- The criterion of presence of an emotionally-estimated component in the semantic structure of the term;
- On the etymological criterion.

Contextual analysis makes it possible to identify the dominant extralinguistic factors in each case. How to make people listen at the scientists? We are afraid that the best way is to learn how to talk to uninformed people in such a form that they get interested in environmental issues.

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***Bulgakov S.V.*[1] *, Borisenko E.V.*[2] *, Tijerina-Borisenko Janet*[3]*, Tijerina-Borisenko Jim-Rus* [4]

EDUCACIÓN EN LÍNEA PARA LOS DEPARTAMENTOS DE ECOLOGÍA.

[1]Master en Comunicacion,Facultad de Comunicación, Univerisdad Estatal de Vías de Comunicación de Moscú,
[2]Professora de Centro de Enseñanza de Lenguas Extranjeras, Villahermosa City, Tabasco, México
[3]Estudiante de Doctorado, Facultad de Ecología, RUDN University,
[4]Máster en Ecología y Estudiante de Magisterio, Facultad de Ingeniería, RUDN University
bulgakov_s@inbox.ru, lienabor@hotmail.com, larusa12@hotmail.com, jim_rus_1@hotmail.com

ONLINE EDUCATION FOR THE DEPARTMENTS OF ECOLOGY

Abstract: The Virtual education for ecologists and Ecology departments give easiness to the public to acquire higher education without polluting the environment

Keywords: Online Education, Virtual Education, Ecology and Higher Education.

Resumen: La formación virtual para los ecologos y Departamentos de Ecología dan facilidad al público para adquirir educación superior sin contaminar ni afectar el medio ambiente.

Palabras clave: Educación en línea, Formación Virtual, Ecología y Educación Superior.

La Educación en Línea, o sea, estudios en línea o formación virtual es relevante ya que los ecologos especializados, docentes de Departamentos de Ecología y estudiantes pueden participar remotamente, a través de las redes de computadoras, haciendo uso intensivo de las facilidades que proporcionan las tecnologías de información y comunicación para obtener como resultado la formación superior [3].

Los estudios en línea es muy comodo para los aprendices y profesores ya que no hay limitaciones ni de tiempo ni de espacio. Este ambiente educativo facilita la interacción cuya finalidad es lograr un objetivo instruccional común.

Si nos enfocarnos en el espacio virtual educativo éste puede ser empleado para el Sistema de Distribución de Información y como Sistema de Formación de Departamentos de Ecología [1, p. 13].

Uno de los aspectos de la formación basado en espacios virtuales para la educación superior más destacados son, en primer lugar, la plataforma dónde entran aspectos didácticos, tecnológicos, el aspecto funcional y estructural, la guía de estudio con su plan y las herramientas de interacción. En estos espacios podemos apreciar características de la formación en línea como la interactiva, síncrona y asíncrona, recursos en línea (on-line), distribuida y colaborativa [2, p. 3].

Los estudiantes en línea que son nuestro recurso humano que mantiene este sistema en rotación, deben estar altamente motivados, tener gran capacidad de organización y administración del tiempo, estar dispuestos al trabajo y estudio independiente, con posibilidad de dedicación al estudio y dominar por lo menos como básico el uso de herramientas de tecnologías de información y comunicación (correo electrónico, foros, chat, navegación y búsqueda web, entre otras) [4, p.7]

Las ventajas de este tipo de enseñanza superior en línea son la apertura, flexibilidad, eficacia, formación y atención permanente y personal y por supuesto la economía. También vale mencionar que el aprendizaje virtual incrementa la capacidad de pensamiento crítico y las habilidades para resolver problemas prácticos de los estudiantes [1, p.45]

CONCLUSIÓN

Este tipo de modalidad ha aumentado en los últimos años su utilización, pues, ya son cientos de universidades, instituciones y centros educativos que utilizan la educación en línea como un medio para ofrecer al público la oportunidad de cursar ya, sea una

carrera o un posgrado completo con un precio aceptable y un horario flexible para las disciplinas de Ecología.

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Giuliodori Lucio

THE RELATIONSHIP BETWEEN MAN AND NATURE IN STEVEN KENNY'S PAINTINGS

Ph. D, Associate Professor of Italian Language and Culture,
Moscow Pedagogical State University, Moscow
luciogiuliodori@gmail.com

Abstract: Surrealism setting a person in a confrontational inner journey where one is compelled to look into oneself, it challenges us to think and wonder. Through nature painting, painters get across the unconscious, unveiling its mysteries. Animals and humans are in Kenny's art always entangled harmoniously.

Keywords: Steven Kenny, nature painting, surrealism

Steven Kenny is a well-known contemporary surrealist painter whose style often features nature, animals and fascinating creatures half human, half animals. Endowed with an excellent technique, the painter shows us marvellous landscapes inhabited

by beings who we can recognize to be as sides of our unconscious.

In an interview that I've done with him, Kenny states: "Surrealism requires an ability to surrender psychologically to those aspects of ourselves which are frightening and uncontrollable. Today's world is a threatening place and many people prefer art that is familiar, non-confrontational, and reassuring". Surrealism instead, set us in a confrontational inner journey where we are compelled to look into ourselves. To this regard the artist says: "One of the most positive features of Surrealism is its accessibility. It allows the general public to recognize what they are viewing but challenges them to think and wonder. Realism tends to dictate its message to the viewer. Surrealism encourages viewers to think more broadly and question reality. In this sense, I think Surrealism is more real than Realism" .

Nature painted by realists is only a photo of the nature we already know, it is just an exercise of painting technique, conversely, nature represented by surrealists holds elements which belong to us as well. Esoterically is known that "the outer world is not but a mirror of the inner one". We should keep in mind that the main goal of Surrealism is trying to investigate the unconscious, nature then is not just nature rather our nature, our inner self. Animals are our instincts, our ancestral primitive side, still dwelling within "somewhere, somehow". Through nature, and its inhabitants, painters try to get across the unconscious, unveiling its mysteries. Animals are sides of us while nature is us in our entirety, in our intimacy and the relationship we have with animals, well painted by Steven Kenny, is the relationships we have with our deepest and primordial part. No coincidence that animals and humans are in Kenny always entangled harmoniously, I think for example at the painting Rescue, where a gigantic eagle rescues a woman in a dark sea landscape, where the sea is obviously the unconscious and the bad dark day represents its unsolved troubles.

The artist said that painting nature represents a moment of self-knowledge, Charles Baudelaire in his famous poem Correspondances writes that we are in an obscure forest (our life) and we should read the symbols on the way, we should be careful and aware of what we see, what we hear, who or what we meet, what happens and so on. All of those are signals, it is how the nature communicates with us, i.e. how our inner self tries to communicate with us. It's no coincidence that shamans have an animal as alley, something similar to the guardian angel for Catholics.

Man and nature then, in Steven Kenny's paintings, are in profound and constant contact, the painter clearly underlines it through his art: a decisive interchange is going on between the two, an invisible chemistry so deep that makes us wonder if they really are separated… This is the main concept merging from Steven Kenny's conception of nature: the latter is not only related to man, it is a part of him. Moreover, it is his inner part, his most important part and, at the same time, its most mysterious one: words such as "soul" or "unconscious" don't hold an objective meaning. We can't describe them scientifically, however, at the same time we can't avoid thinking what they could mean. We can paint them. Steven Kenny says: "Surrealism is just one of many ways to express how we relate to the world. I believe our most basic human need is to reveal who we are, to be heard and seen, to be acknowledged and understood. Art is the best way to do that" . To be heard of seen by who? I don't think the meaning is here addressed only to people surrounding us, I conversely think we, mainly, need to be heard and seen first by ourselves. George Gurdjieff said that we live without realizing it, as if our life walks besides while we live . Surrealism is a way to get in touch with ourselves, with our unconscious. The relationship between man and nature then is practically the relationship between mind and body, what we are inwardly and what we are outwardly, man and nature are one, this is what I've read in Steven Kenny's art.

The implications are totally positive and they are elegantly and implicitly underlined by the role of birds. Kenny paints them repeatedly and they, as he stated clearly, represents “freedom, weightlessness, spirit, escape, the soul, inspiration, hope” . In addition to that, they also are: “a reflection of ourselves on another plane or as ethereal agents acting upon us”.

Birds then are the conjunction between nature and us, between our material and spiritual side, birds are a bridge, they are our great possibility, congenital, to fly deep down vertiginously inside ourselves, through them we can see hidden landscapes, the ones composing our unconscious. *Visita interioa terrae, rectificando invenies occultum lapidem*, as the famous alchemical motto declaims, birds represent the way to acknowledge that goal, the goal.

Iugay D.A[1]., Nurtaeva A.K[2].

STUDENT VIEWS ON USE OF MOODLE IN TEACHING ECOLOGY COURSE

Kyrgyzstan, Kazakhstan
[1]Bachelor student, KIMEP University, Almaty
daria.iugay@kimep.kz
[2] Ph.D., Professor, KIMEP University, Almaty
anurtaeva@kimep.kz

Abstract: This study discusses the process of using virtual learning environment system as a tool for facilitating both teaching and learning engagement in Ecology course and reflects students’ views of MOODLE-based teaching platform. The results of online survey conducted in undergraduate students, demonstrated positive attitude toward ‘blended’ teaching mode.

Key words: virtual learning environment (VLE), MOODLE, online teaching, hybrid learning, face-to-face (F2F) teaching.

Implementation of MOODLE as a popular VLE (virtual learning environment) system provides variety of tools to enhance both teaching and learning process. Interactivity,

collaboration between teacher and learner, variety of assessment techniques with performance control options and report-generating ability are some of the features that attract educators to this free open-source software. The students' views of MOODLE implementation at KIMEP University, western style high-ranking university in Kazakhstan are discussed in this study.

Ecology course is one of the required courses in all higher education institutions in Kazakhstan. The basic aim of environmental education is to prepare young Kazakhstani people for future ecological challenges in the management of the quality of the environment. Being a natural science course in undergraduate curriculum, it is both intensive and challenging for business and humanities students. Use of 'blended' learning model in teaching Ecology includes MOODLE incorporation into online portion of the course so that traditional face-to-face teaching mode becomes enriched with online components. One of e-technology tools used was Lecture Capture [1], or lecture recording, used to make selected, more difficult portions of lecture material available for the students in asynchronous environment. These topics are delivered to students twice: in a classroom as a part of a regular face-to-face traditional lecture and online delivery in the form of recorded and posted on MOODLE site short videos (10-12 min maximum). The main goal is to enhance learning of challenging topics like 'Solar radiation', 'Tolerance curves', 'Toxicity: how to measure it?' etc. To assure students' actual learning of these topics delivered in combined mode, small home tests were introduced as a part of continuous assessment methods.

One of the problems in online learning environment is higher opportunities for the students to cheat, since they can ask someone to take an exam for them or completing the test together with classmates. The following measures were undertaken to reduce cheating cases: online test was assigned only on certain day and time, preferable late evening, when most of local students are already at their homes; each home test is visible

(available online) within limited time period; video recording of the relevant topic is not available during the test time period; the total number of points for each home test is not significant.

This study reflects the students' views on use of VLE in general and particularly on use of MOODLE in synchronous and asynchronous environment. The data was collected using anonymous e-survey (Survey Monkey) which allows analysis with Excel. Our sample consisted of 25 students – section with more MOODLE tools used, including video recordings, synchronous quizzes, asynchronous home tests. For comparative study, another group of 50 students was used, in which the course was delivered following mostly traditional face-to-face teaching mode with fewer MOODLE tools used such as asynchronous home tests. Additionally, qualitative data were collected by interviewing five randomly selected students.

The questions were organized and grouped around the two main research questions: whether the use of MOODLE is useful, having a positive impact on student learning; what is students' attitude towards MOODLE: does it increase their motivation to learn. All students taking Ecology class were invited to complete the survey in their own convenient time.

The feedbacks received from students demonstrated strong evidence that students like how new activities with MOODLE-based e-learning system effect on their productivity and the attitude toward their study. Fig.1 demonstrates students' response to some of the survey questions on use of virtual learning environment in Ecology course:

A - I like working with MOODLE; B – If I use MOODLE, I will increase my chances of getting knowledge; C – MOODLE makes learning more interesting. According to pie charts shown, 66% of students like working with MOODLE, 24% are not certain, and only 8% disagreed with the statement A. The data obtained on statement B provided evidence that the use of a VLE increases students' motivation to learn, making learning more interesting: positive responses expressed 78% of the respondents,

9% neither agreed nor disagreed and 13% of students disagreed with the statement B. The word 'fun' was frequently used by those students who reported high level of interest and preference in online learning. Usefulness of MOODLE as a tool to get more knowledge was tested in question C. As it is shown, 66% of respondents agree with this statement which implies their belief in higher learning outcomes from the 'online' study course. 26% of students are not certain, and 8% disagree with this statement.

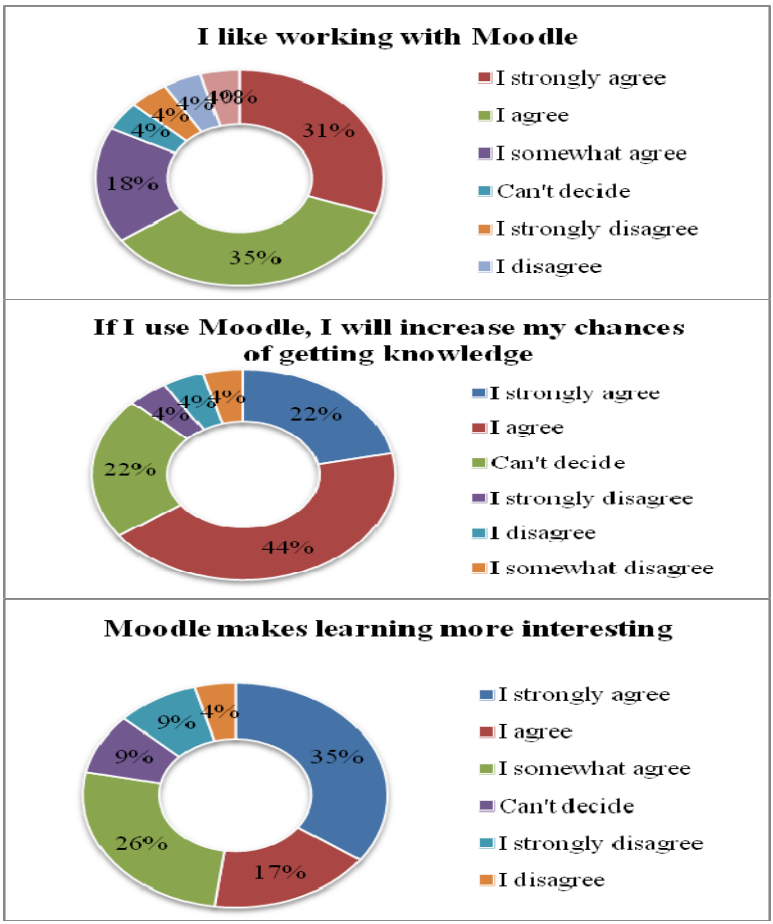

Figure 1. Students' response to the survey questions on MOODLE use in Ecology class

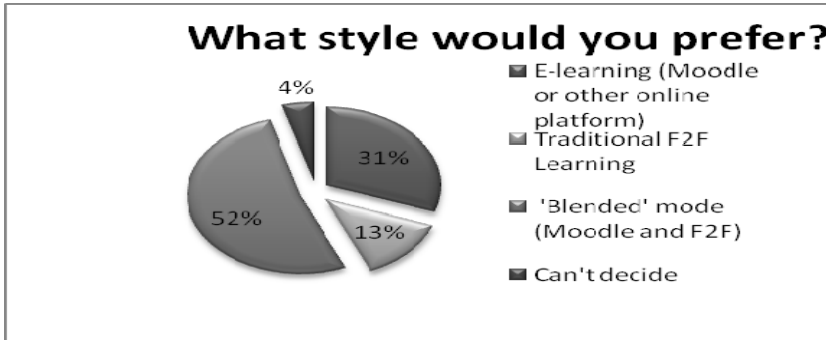

Figure 2. Results of students' preference for teaching style

Figure 2 demonstrates students' choices on type of instruction preferable: traditional face-to-face; fully online (MOODLE or other online platform), and hybrid or 'blended' type, which combines F2F and online teaching. 52% of respondents preferred hybrid version, 31% supported fully online course and only 13% expressed their preference for traditional teaching methods.

Overall, this study gives us the evidence that students have a higher satisfaction when Ecology course is blended, as compared to online or traditional, face-to-face course. This result is fully correlated with most of the research conducted in the area [2], according to which, students demonstrated high level of satisfaction toward hybrid learning. The student achievements measured in hybrid courses were also higher than the results in purely online or traditional F2F course. It is difficult in this small-scale survey to draw conclusions on the results of assessment methods conducted in online and face-to-face classes. But it is obvious that hybrid model offers the most significant benefits for education, with virtual learning environment as a tool to enhance both learning and teaching.

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Nikitin S.A.[1], Avdonina M.Yu.[2], Nikitina M.A. [3]

ENVIRONMENTAL ASPECTS OF THE "VELONOTTE" EDUCATIONAL PROJECT AND PRESERVATION OF URBAN CULTURE OF KAZAN

Italy, Russia
[1]Candidate of Philology, Associate Professor,
Università degli Studi di Verona, Verona, Italy
ser.nikitin@gmail.com
[2]Candidate of Psychology, Associate Professor,
RUDN University, Moscow
mavdonina@yandex.ru
[3]Art critic, Executive Producer of the "Velonotte" project
shatlisss@gmail.com

Abstract: The environmental education is one of the main components of the "Velonotte" project, a night by bike format. Three events held in Kazan in 2014-2016 have been analyzed in order to evaluate the impact of such new forms of environmental consciousness formation of adult educated inhabitants of a metropolis. Urban environment landmarks have been selected in the capital of Tatarstan.

Key words: urban ecology, environmental awareness, project methodology, "Velonotte" format, adult education

Velonotte International is a project that brings together an active lifestyle, culture and knowledge. As the authors of the project, we seek including residents of a big city in new kinds of cultural activities. The bike ride is considered as a special language of communication in move, which offers new feeling of the city, creating confidence between participants. Urbanism, landscape and architecture, music, literature and history are combined in this format with the 25-30-km overnight travel by

bicycle. In each event, several thousand people have been involved the last few years [2].

The present research is devoted to an analysis of three Velonotte's events conducted in 2014-2016, their cultural and sporting activities in the framework of a new youth format.

The purpose of research is to identify the environmental component of the project [3], and in particular, the possibilities and forms of educational work with adults who contribute to attract residents and guests of a metropolis, in particular, Kazan the capital of Tatarstan, to take part in preserving the environment and culture of the region.

During the preparatory stage we specified the seasonal condition of the chosen locality and its cultural and ethnic basis. The form of brainstorming helps choosing urban environment [1] to discuss with our speakers (the night is accompanied by a radio commentary), in particular, it is important to send a message to the citizens and especially, to the deciders to improve the environmental situation.

The Kazan Night event of 2014 discussed measures for the conservation of biological diversity in the area; it concentrated on the plants in the history and contemporary life of the city. We called it the "Starlight Velonotte" because the main goal was to present famous scientists having worked and working in Kazan. Speakers talked about the two centuries of the Kazan University. We managed to surprise a lot of Kazan residents, employees of the city administration: the logo was a bicycle wheel with *Aster Tataricus* inscribed in it (aster si star in Latin). They ignored that the armory of Tatarstan has this flower in the center. For us, the authors, it was important because the story about this medicinal plant famous in the Far East includes Kazan to the world culture.

The Velonotte 2015 was dedicated to water issues; in 2016 we touched the air pollution problems.

The very important stage of the project can be figuratively called the "aftertaste and anticipation." Let's see the memory of one participant: "At last it is Saturday. The city is gradually filled

with friends from other cities. On bicycles. Ufa, Nizhni, Ulyanovsk, Moscow, St. Petersburg. Social networks rage. At ten the scene near the Kremlin walls gets overcrowded [..]. Final: at dawn we drive along the bumpy road to Zilant Monastery. And I do not believe my eyes – the road is newly covered with asphalt! not the patching, as we requested, but new asphalt. Zilant hill, the sun rise; the Kremlin still has a soft silvery haze. The final spurt... I shall remember it for a lifetime. Divine, golden sunrise, I am happy. Kazan Starlight Velonotte has been completed. I wish that this feeling did not end" [3]. This stage refers to the experience of the success / failure of both the authors and the project participants, the expectation of a next year project.

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Utkina E.A. [1], *Zhabo N.I.* [2]

ORGANIC LAVENDER SOAP: ECO-PROJECT FORMING ENVIRONMENTAL CONSCIENCE

[1]*Bachelor`s student of the Agrarian Technological Institute*
utkinal@gmail.com
[2]*Candidate of Philology, Senior Lecturer,*
lys11@yandex.ru
Russia, the Republic of Belarus

Abstract: The study relates to the production of home-made organic soap with essential oil of lavender. The goal is to create an explanation of its curative properties and effect on sensitive skin for people attracted by advertising based on science. The mode to explain functions of natural dyes, perfumes, scrubs is discussed with the support of a video made to show the detailed preparation process. But the true aim of the message is to promote environmental policies and attract new supporters to eco-friendly activities

Key words: organic soap, skincare product, customization, lavender

Introduction**.** At the beginning of the XXI century, the soap is a must; we see revived public interest in the use of natural products that are considered healthier. One of the modern ways to persuade a customer is to build advertising campaign based on science. What we need is to take into consideration the psychological side of the customer who is stressed out at work, who is attacked by air pollution and climate change. Our study focuses on how to make buy a homemade soap and form the environmental conscience as a consequence.

The methodology is to prove the high quality and efficiency of the added skincare product for a given type of skin, speaking at the same time about main environmental issues of the present days. We buy the previously saponified base manufactured at a pharmaceutical factory. To prepare the home-made lavender soap we need: 100g of soap base Organic, 5 g of coconut oil, one teaspoon of honey, 4 drops of essential oil of lavender, a drop of organic dye, 1 ml of aloe Vera, flowers and dried lavender sprigs.

Results and discussion. The functions perceived by the customer and those conceived by the researcher are different. A video [5] was filmed by the RUDN students of Agrarian-Technological Institute. The explanation points that it is important to apply cosmetic products made for each skin type: 1) for a nourishing soap, you have honey, Shea butter, aloe Vera; 2) for exfoliating effect we can put sugar, almond powder; 3) for the desired color chlorophyll or spices are added; 4) for the fragrance floral waters or essential oils are chosen; 5) for better conservation of soap we recommend vitamin E that prevents microbial growth. We talk about combination skin [2] when the T-zone (nose, forehead and chin) has imperfections, especially black spots as a reaction of the sebum lipids with air. On the cheeks and temples, the skin is dehydrated and sometimes it feels tight because of lack of lipids.

The other position is why to choose lavender? First, for its medicinal properties: today, lavender is a popular plant in herbal medicine helping nervous and digestive problems. It has anti-spasmodic effect and soothes irritated skin: eczema, acne, minor burns, insect bites. It helps to heal and clean the wounds and ulcers. It has anti-parasitic effect [1; 4]. Its curative powers add to the benefits of organic soap for combination skin.

All terms used above have a convincing effect forming a new perception of a familiar object. The customer learns to choose the soap following the criteria of health benefit the advertisement gives, one of the first being “natural ingredients”.

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ЭКОЛОГИЧЕСКИЕ ПРОБЛЕМЫ ТРЕТЬЕГО ТЫСЯЧЕЛЕТИЯ

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Российский университет дружбы народов
115419, ГСП-1, г. Москва, ул. Орджоникидзе, д. 3

Типография РУДН
115419, ГСП-1, г. Москва, ул. Орджоникидзе, д. 3, тел. 952-04-41