

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL AVIATION UNIVERSITY**

Faculty of Environmental Safety, Engineering and Technologies

DEPARTMENT OF ENVIRONMENTAL SCIENCE



LECTURE NOTES

on the subject «Introduction into Major»

Educational Professional Program: «Ecology and Environmental Protection»

Field of study: 10 Natural Sciences
Specialty: 101 Ecology

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Lecture notes were discussed and approved
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Head of the Department T. Dudar

Lecture No 1

Title: General concepts about the discipline "Introduction into Major"

Lecture Plan:

1. The connection of the educational discipline with fundamental and special disciplines.
2. The role of the discipline in the formation of a bachelor-ecologist, his acquisition of the necessary professional knowledge, skills and competencies.
3. The history of the development of ecology as a science, the main stages of its formation, the purpose, tasks and methods of ecology.
4. Main areas of work and responsibilities of an ecologist.

References:

1. Bilyavskiy G.O., Butchenko L.I. Basics of ecology: theory and practice. Education manual - K.: Libra, 2006. - P. 10-34.
2. Bilyavskiy G.O., Furduy R.S., Kostikov I.Yu. Basics of ecology: Textbook, 2nd ed. - K.: Lybid, 2005. - P. 8-25.
3. Heinrich D., Gergt M. Ecology: dtv-Atlas: trans. from the 4th German kind. / Artist Rudolph and Rosemary Fanert; of science ed. trans. V.V. Serebryakov - K.: Znannia-Press, 2001. - P. 248-258.
4. Nekos V.Yu. Nekos A.N. Introduction to the profession: tutor. [for students environmental specialties of higher education. institutions]. - 3rd ed., revised. and additional – X-: KhNU named after V.N. Karazina, 2009. - P. 3-18.
5. Saienko T.V. Education of an environmentally safe information society: problems and prospects. Monograph. - K.: Education of Ukraine. - 2008. - P. 42-63.

Content of lecture

1. Environmental education in the third millennium acquires special importance due to its mandatory component in sustainable (balanced) development. Environmental education of the youth and the entire population in the state in general require significant attention, since environmental problems require the most prompt solution and concern, first of all, unsatisfactory indicators of the state of the environment and people's health. The quality of higher environmental education is one of the important issues at the current stage of the elimination of the ecological crisis, the improvement of the socio-economic situation in the state, the reproduction of its natural resource potential, and the successful resolution of the country's environmentally safe development depends on its solution.

Our students study the following disciplines: General ecology; Hydroecology; Pedology; Topography with the basics of cartography; Economy nature management; Radioecology; Management of environmental protection activities; Monitoring and methods of measuring environmental parameters; Environmental law; Modeling and forecasting of the state of the environment; Landscape ecology; Human ecology; Biogeochemistry; Urboecology and technoecology; Protected business; Normalization of anthropogenic load on the natural environment; Environmental audit and certification of territories and enterprises; Ecotoxicology; Statistical accounting and information banks in ecology; Waste disposal and recovery; Ecology, aviation, space; Environmental expertise; City communal economy; Basics of environmental security of territories and water areas and environmental inspection.

2. Ecology is a branch of science and practical activity related not only to the protection of the natural environment, the creation of new technical and technological complexes, obtaining clean products and food products. It also has a pronounced humanistic orientation, as it occupies a

prominent place in philosophy, medicine, psychology, art, politics, and culture. Moral aspects of the relationship between man and Nature constitute the main system-forming function in it, which reflects the basic social meaning of its existence. Important system-forming factors (signs) of ecology include:

- **Integrativeness** is the systemic unity of the objects of Nature, all living organisms, which are studied through the implementation of an interdisciplinary scientific approach and the comprehensive use of knowledge from various disciplines and areas of modern science - philosophy, biology, chemistry, physics, psychology, sociology, cybernetics, pedagogy, political science.

- **Polymorphism** – diversity of spheres, environments and levels of manifestation of the interaction of living and non-living ("oblique" according to V.I. Vernadskyi) matter. This diversity includes: biosphere with its flora, fauna, microorganisms, soils; geosphere, which includes the atmosphere, lithosphere, hydrosphere; cosmosphere with energy-information manifestations and the vacuum of the universe; anthroposphere, sociosphere, technosphere with the integrity of biochemical, biophysical, mental, sociological, pedagogical aspects; finally, the noosphere with subsystems of culture, ethnic groups, communication and technical-technological achievements, social development. All the listed components can be conditionally divided into six levels of matter organization: anthropological, social, biological, physico-chemical, planetary-geological, cosmic.

- **The scale and globality** of the manifestation of environmental phenomena covers the micro-, macro- and mega-levels.

- **Perspective, outlook, harmony.**

Modern scientists claim that it is worth taking a new look at the status of information in the relationship between man and the world as a whole. First, information must be approached from the standpoint of Cosmism: a person, his destiny, the meaning of life, moral principles can be truly understood and explained only under the condition of considering an individual as a whole Cosmos.

3. Only young people who grew up and were formed on the ideas of the supremacy of ecology and are not blinded by highly specialized education are able to create **a professional ecological environment** in the state, region, and the world, effective and responsible teams of specialists - bearers of fundamental ecological knowledge, without which it is impossible to solve numerous ecological problems. Domestic nature management is still far from comprehensive environmentalization and **needs the training of professionals** who are able to prevent local environmental problems and large-scale disasters.

4. Functional responsibilities of an ecologist include:

- ability to work in a team of professionals in the chain: research - forecast - technological process - management - production - marketing - use - disposal - environmental audit;
- the ability to carry out scientific and pedagogical activities for the further training of ecologists and specialists in related specialties.

The practical sphere of activity of an ecologist is expressed in:

1. Compilation of the ecological passport of production.
2. Implementation of scientific ecological, socio-economic expertise of projects.
3. Developers of the development forecast of possible project scenarios.
4. In scientific-pedagogical and research work.
5. Select and define the object, subject, aspect, goal and method of research, correlate the selected subject or its individual components with the available own experience or the experience of other studies.

6. To evaluate the place, meaning and degree of importance of the subject of research in the complex of researched problems.
7. Highlight research keywords.
8. Assess the degree of novelty of a new concept in comparison with what already exists.
9. Form a meaningful part of the geoinformation system, build simple models of natural objects.
10. Work with data banks.
11. Analyze and choose optimal research methods.
12. Apply the necessary research methods in practical activities.
13. Plan research, in particular, using the theory of experiment planning.

Lecture No 2

Title: A modern model of an ecologist.

Lecture Plan:

1. Higher education, institution of higher education, field of knowledge, educational level of higher education, standard of higher education, curriculum, content module, educational and professional program, object of activity, Law of Ukraine "On Higher Education".
2. Forms of obtaining education in institutions of higher education: full-time, part-time, distance learning.

References:

1. Standard of higher education for bachelor's training in specialty 101 "Ecology". SVO-2018. - K.: Ministry of Education and Science of Ukraine, 2018. - 20 p.
2. Law of Ukraine "On Higher Education" dated July 1, 2014 No. 1556-VII as amended.
3. Standards and recommendations for quality assurance in the European Higher Education Area (May 14-15, 2015, ESG 2015).
4. Saienko T.V. Education of an environmentally safe information society: problems and prospects. Monograph. - K.: Education of Ukraine. - 2008. - P. 147-170.

Content of lecture

1. The main criterion for revising the list of specialties was to bring it into line with the **requirements of the international standard education qualification**, which should contribute to the entry of Ukraine into the international system of accounting and statistics. After revision, the new list recorded 69 fields of bachelor's training, 270 titles of junior specialist training and 277 specialties at the "specialist" and "master's" levels. As for the ecological direction, before the reduction there were five specialties, without taking into account the numerous branch ones: **ecology, geoecology, radioecology, monitoring of the natural environment, applied ecology**. In these specialties, training was carried out at the level of a junior specialist, bachelor's degree, and master's degree. At that time, there was only one specialty left - "Ecology", which was given the right to train a teacher. This was the first stage of the implementation of the program of structural reform of education in Ukraine, which began in 1997. It served as a fundamental basis for practical steps regarding the development of the professional education system in Ukraine. Ahead were new tasks and opportunities for new restructuring.

2. Multi-level higher education currently operates in Ukraine: bachelor's, master's, PhD. The ecological direction has one specialty "Ecology" at all educational levels with the right to train "teacher of ecology" in higher educational institutions. The main state regulatory documents, on the

basis of which the training of a modern ecologist is carried out, are the educational and qualification characteristics and the educational and professional program.

Educational and qualification characteristics (EQC) is a state regulatory document that summarizes the content of education, that is, reflects the goals of educational and professional training, defines the main requirements for a specialist, his place in the structure of the state economy. The educational and qualification characteristics establish the professional status of an environmental specialist, who is graduated by a higher school in full-time, correspondence and distance education, as well as the qualification requirements put forward to him. EQC should be used when forecasting the needs of specialists, when planning training, substantiating specializations, organizing the educational process in higher educational institutions, distribution, placement and use of graduates of higher education institutions of Ukraine.

The educational and professional program (EPP) of specialist training is a state regulatory document that summarizes the content of training, sets requirements for the content, scope and level of educational and professional training of a specialist in a certain specialty, of a certain educational and qualification level.

Quality control of higher education is a system of measures carried out by a third party in order to check the characteristics of the qualities of a person - a graduate of a higher educational institution - and compare them with the established requirements, and determine compliance with the ultimate goal of higher education.

Knowledge is the result of the process of cognition, verified by social practice and logically ordered in the mind of a person.

A skill is a person's ability to perform certain actions when performing one or another activity on the basis of relevant knowledge.

Competences are actions that are performed when performing a certain activity, and due to repeated repetitions, they become automatic.

Lecture No 3

Title: A modern model of an ecologist.

Lecture Plan:

1. Participants of the educational process. Mobility of students of higher education, teaching staff and other personnel.
2. Peculiarities of training a higher education student in connection with Ukraine's entry into the European and world educational space.

References:

1. Standard of higher education for bachelor's training in specialty 101 "Ecology". SVO-2018. - K.: Ministry of Education and Science of Ukraine, 2018. - 20 p.
2. Law of Ukraine "On Higher Education" dated July 1, 2014 No. 1556-VII as amended.
3. Standards and recommendations for quality assurance in the European Higher Education Area (May 14-15, 2015, ESG 2015).
4. Saienko T.V. Education of an environmentally safe information society: problems and prospects. Monograph. - K.: Education of Ukraine. - 2008. - P. 147-170.

Content of lecture

1. The educational and professional program of bachelor's training ensures the simultaneous acquisition of basic higher education in the direction of bachelor's training and qualification on the basis of complete general secondary education. The designated bachelor's training program consists of general fundamental, humanitarian, and socio-economic disciplines of the relevant field of training, as well as various types of practical training. The normative term of study cannot exceed four years. The educational and professional program of bachelor's training is implemented by **higher educational institutions of III and IV levels of accreditation.**

The master's training program ensures the simultaneous acquisition of a full higher education in the specialty and a master's qualification on the basis of the corresponding educational and professional bachelor's training program. The normative term of study is determined by the program, but cannot exceed one year, and for certain specialties, in agreement with the Ministry of Education, a term of one and a half years can be established. The mentioned master's training program includes in-depth fundamental, humanitarian, socio-economic, psychological, pedagogical, special and scientific-practical training. The higher educational institution implements educational and professional programs for the preparation of masters in specialties of the IV level of accreditation. Persons who have successfully passed the state certification receive documents of the established model on obtaining a full higher education in the specialty and the qualification of master of ecology.

2. An important area of development of European integration is the area of higher education, where it took the form of the Bologna process. 45 European countries, including Ukraine, are its participants. A significant number of international organizations support the ideas of the process and contribute to its implementation.

The Bologna Process is a process of European reforms aimed at creating a common European Higher Education Area by 2010. It officially began in 1999 with the signing of the Bologna Declaration. The prerequisite for its creation was the signing of the Great Charter of European Universities in order to facilitate: easier movement of citizens for the purpose of further study or employment in the European Higher Education Area; increasing attractiveness of European higher education; ensuring the further development of Europe as a stable, peaceful, tolerant, balanced society.

On May 19, 2005, in the Norwegian city of Bergen, at the Conference of Ministers of Education of the European Countries, Ukraine joined the Bologna process, pledging to make appropriate changes to the national education system and to join the work on determining priorities in the process of creating a single European area of higher education by 2010.

The ideas of educational and cultural unification of European countries in general and universities in particular were continued in the **Great Charter of Universities (Magna Charta Universitatum)**, which was the final result of the proposal addressed by the University of Bologna in 1986 to all the oldest European universities. The idea of the Magna Carta was received with enthusiasm.

First of all, there is a trend of our intellectual potential towards Europe, and not the other way around, that is, there is an outflow of the best minds from Ukraine. The situation with the "destiny" of the educational qualification level of "specialist" is not fully understood, because the European education system does not provide for this level of two-level training (bachelor - master). At the same time, the domestic system of labor organization is focused only on specialists, not on bachelors and masters.

Lecture No 4

Title: Environmental rights and responsibilities of citizens.

Lecture Plan:

1. The system of legally established powers and obligations of citizens in the environmental sphere. Constitution of Ukraine.
2. Law of Ukraine "On Environmental Protection". Guarantees of implementation and methods of protection of environmental rights of citizens.

References:

1. Law of Ukraine dated June 25, 1991, No. 1264-XII "On Environmental Protection".
2. Standard of higher education for bachelor's training in specialty 101 "Ecology". SVO-2018. - K.: Ministry of Education and Science of Ukraine, 2018. - 20 p.
3. Law of Ukraine "On Higher Education" dated July 1, 2014 No. 1556-VII with amendments.

Content of lecture

1. Environmental law is a system of legal norms that regulate public relations for the protection of natural resources and the rational use of natural resources (environmental relations). The system includes such sub-fields as land, water, forest, mining law and some other fields of law, which regulate relations on the protection and rational use of certain types of natural resources.

The subject of environmental law is normatively regulated relations on the protection of natural resources and the rational use of natural resources. The method of environmental law is complex and represents a combination of methods of sub-branches of law that make up its system. Ukraine's environmental laws provide for citizen participation in decision-making, and local authorities must guarantee a safe environment for citizens. Often, these obligations exist only on paper, because there is no procedure for implementing these norms in life.

2. Environmental rights and responsibilities of citizens of Ukraine – a system of legally enshrined powers and obligations of citizens in the environmental sphere. Environmental rights and obligations are most fully enshrined in the Law of Ukraine "On Environmental Protection" (Articles 9-12). According to the Law, a citizen of Ukraine has the right to: a natural environment that is safe for life and health; unification in public nature protection formations; obtaining complete and reliable environmental information, etc. in the prescribed manner. In addition, it is written in the Constitution of Ukraine: "Everyone has the right to an environment safe for life and health and to compensation for damage caused by the violation of this right. Everyone is guaranteed the right of free access to information about the state of the environment, about the quality of food products and household items, as well as the right to its distribution" (Article 50).

All environmental rights of citizens are protected and restored in court. Along with rights, the Law of Ukraine "On Protection of the Natural Environment" also provides for some obligations in relation to citizens. Thus, citizens are obliged to: preserve, protect and rationally use natural resources; not to violate the environmental rights of other subjects; to compensate for the damage caused by them, etc.

Every citizen of Ukraine has the right to: participate in the discussion and submit proposals to draft regulations, materials regarding the placement, construction and reconstruction of objects that may negatively affect the state of the natural environment, submit proposals to state authorities and

local self-government bodies, legal entities participating in decision-making on these issues; participation in the development and implementation of measures for environmental protection, rational and integrated use of natural resources:

- implementation of general and special use of natural resources;
- association in public nature protection formations;
- free access to information about the state of the Environment (environmental information) and free receipt, use, distribution and storage of such information, except for limitations established by law;
- participation in public hearings or open meetings on the impact of planned activities on the Environment at the stages of placement, design, construction and reconstruction of objects and in conducting public environmental expertise;
- receiving environmental education;

In addition, the Constitution of Ukraine states: "Everyone has the right to an environment that is safe for life and health and to compensation for damage caused by the violation of this right. Everyone is guaranteed the right to free access to information about the state of the environment, about the quality of food products and household items, as well as the right to its distribution" (Article 50). Similar formulations are explained by the fact that this right is one of the main human rights. This right corresponds to the duty of the state to ensure the implementation of measures aimed at the improvement and rehabilitation of the Environment.

Lecture No 5

Title: Academic integrity in higher education.

Lecture Plan:

1. Academic integrity as a set of ethical principles and rules defined by law, which should be guided by the participants of the educational process during learning, teaching and carrying out scientific (creative) activities.
2. Principles of academic integrity.

References:

1. Law of Ukraine "On Higher Education" dated July 1, 2014 No. 1556-VII as amended.
2. <http://ecoosvita.org.ua/storinka/pro-nas>
3. <https://www.ecoleague.net/pro-vel/tematychni-napriamy-diialnosti/osvita-ta-informuvannia>
4. <https://www.ecolabel.org.ua/images/page/zeleniy-klass-2015.pdf> 5. <http://dspace.zsmu.edu.ua>

Content of lecture

1. The process of creating a knowledge society puts the sphere of higher education at the center not only of the development of fundamental and applied science, the formation of future social and professional elites, it makes it generally responsible for the interpretation, dissemination and use of new knowledge.

The ethics of the higher school, the values underlying its scientific and educational activities, the principles and rules of relations in each educational institution, in teaching teams, in relations with students are the basis of the academic corporation's ability to effective self-regulation and the ability to satisfy society's demand.

Thus, conscious moral choice, concern for reputation become one of the main mechanisms of internal self-regulation of the professional community, determine its ethical priorities, balance of power and logic of professional communications.

Academic integrity, as a certain social ideal, should counteract the excessive commercialization of universities, their intensive bureaucratization, which destroy not only the ability to fulfill their social mission, but also the logic of their existence.

2. Violation of the principles of academic interaction, undermining of corporate solidarity and trust, reduction of professional involvement, low interest in the active activities of the academic community — all this is a consequence of the limited autonomy of the academic space. The activity of the academic community can be effective only if it is based on a certain set of values that will **unite very different people in one team and give meaning to their joint activities.**

In 2012, the International Center for Academic Integrity at the Rutland Institute for Ethics, Clemson University in South Carolina, developed a document called “The Core Values of Academic Integrity” (Fishman 2012). According to this approach, academic integrity is the academic community's commitment, even in the face of adversity, to six fundamental values: honesty, trust, justice, respect, responsibility, and courage. Here is how they are interpreted:

Honesty. Academic communities of integrity advance the pursuit of truth and knowledge through intellectual and personal integrity in learning, teaching, research, and service delivery at the behest of administration.

Trust. Academic communities of integrity encourage and rely on a climate of mutual trust. A climate of trust encourages and supports the free exchange of ideas, which in turn enables scientific research to be realized to the fullest extent.

Justice. Academic communities of integrity establish clear and transparent expectations and standards for maintaining fairness in relationships between higher education students, faculty, and administrative staff.

Respect. Academic communities of integrity value the interactive, cooperative, and participatory nature of learning and learning. They respect and value diversity of opinions and ideas.

Responsibility. Academic communities of integrity rely on the principles of personal responsibility, which is reinforced by the willingness of individuals and groups to exemplify responsible behavior. Maintain mutually agreed standards and take appropriate action in case of non-compliance.

Courage. Building and sustaining academic communities of integrity requires more than simply believing in fundamental values. The transformation of values from talking about them to corresponding actions, their defense in conditions of pressure and difficulties requires determination, purposefulness and courage.

In Ukraine, in accordance with the provisions of the Laws of Ukraine "On Education" and "On Higher Education", academic integrity is defined as a set of ethical principles and rules defined by law, which should be guided by the participants of the educational process during learning, teaching

and carrying out scientific (creative) activities in order to ensure trust in the results of studies and/or scientific (creative) achievements.

Lecture No 6

Title: Ecology among natural sciences in the context of sustainable development.

Lecture Plan:

1. Principles of sustainable development. Constituent concepts of sustainable development.
2. Indicators of sustainable development. UN Sustainable Development Goals.
3. Sustainable development goals of Ukraine for the period up to 2030.

References:

1. Law of Ukraine "On Higher Education" dated July 1, 2014 No. 1556-VII as amended.
2. <http://ecoosvita.org.ua/storinka/pro-nas>
3. <https://www.ecoleague.net/pro-vel/tematychni-napriamy-diialnosti/osvita-ta-informuvannia>
4. <https://www.ecolabel.org.ua/images/page/zeleniy-klass-2015.pdf> 5. <https://conf.ztu.edu.ua/wp-content/uploads/2019/12/64.pdf>

Content of lecture

1. Sustainable development is a general concept regarding the need to establish a balance between meeting the current needs of humanity and protecting the interests of future generations, including their need for a safe and healthy environment.

The main principles of sustainable development are: • the principle of "satisfaction of needs" - the needs of the poorest sections of the population are prioritized; • the principle of "setting limits": limits are imposed on the development of humanity and the state of technology in order to preserve the environment.

Sustainable development implies a thrifty attitude to the environment, when people will take from nature only what is necessary for their life, necessarily taking into account whether nature can restore this resource.

"Without effective protection of the environment, the development of humanity will stop, and without the development of humanity, effective protection of the environment is impossible."

The concept of sustainable development emerged as a result of combining **three main components: economic, social and environmental.**

2. At the international level, a project of **134 indicators of sustainable development** has been developed [Indicators of sustainable Development, UN Publication, 1996]. This number is divided into the following main groups: indicators of social aspects of sustainable development, indicators of economic aspects of sustainable development, indicators of ecological aspects of sustainable development (including characteristics of water, land, atmosphere, other natural resources and waste) and indicators of institutional aspects of sustainable development (policy programming and planning, scientific developments, international legal instruments, information support, strengthening the role of the main population groups), the indicators proposed in the project require special transformations, adaptation to specific conditions, and in some cases – expansion for individual countries. The use of indicators proposed by the international project limits their use in many countries due to the lack of necessary information and statistical data.

Thus, **the USA used only 56 indicators in its sustainable development strategy**, most of which are qualitative. The countries of the Organization for Economic Cooperation and Development (OECD) have been developing a program of sustainable development indicators since 1990 based on the following requirements [OECD Policies to Enhance Sustainable Development. OECD. Paris, 2000.]:

The conceptual basis of the OECD indicators is the triad: pressure (on the environment) - state (of the environment) - response (necessary measures), which is similar to the requirements for UN indicators [OECD Policies to Enhance Sustainable Development. OECD. Paris, 2000].

Pressure indicators are indicators of human activity, processes and characteristics that can positively or negatively affect sustainable development. These indicators correspond to the company, industry or economy level. Examples of such indicators are population growth or greenhouse gas emissions. **Status indicators** capture the characteristics of sustainable development in a given area at this very moment. It can be population density, percentage of urban population, fuel, water reserves, etc. **Indicators of response** include political choice and other reactions to changes in the characteristics of sustainable development. Examples of such indicators are spending on improving health, legislation, regulation and regulation, economic instruments, etc. The same model is used in the development of sectoral (industry) indicators, which should reflect trends in the development of the industry and their ecological significance, the interaction between the industry and the environment (includes positive and negative effects of the development of the industry on the environment and the effects of changes in the latter on the development of the industry), economic connections between the industry and the environment.

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to reduce poverty, protect the planet and ensure that by 2030, all people live in peace and prosperity.

Decree of the President of Ukraine "On the Sustainable Development Goals of Ukraine for the period up to 2030".

Lecture No 7

Title: Environmental management, marketing, audit, regulation as an environmental management system

Lecture Plan:

1. Organizational structure of the environmental management system.
2. Environmental management systems (state environmental management system, corporate environmental management system, local environmental self-government system, public environmental management system).
3. Environmental management, marketing, audit, regulation in the system of environmental management.

References:

1. Bugayev O.P., Rudko G.I., Bilyavskiy G.O., Yatsyshyn A.V. Environmental security of man in the universe: resource and energy information aspect: in 2 volumes. - Kyiv-Chernivtsi: Bukrek, 2018. - Volume 1. - P. 29-134.

2. Bugayev O.P., Rudko G.I., Bilyavskiy G.O., Yatsyshyn A.V. Environmental security of man in the universe: resource and energy information aspect: in 2 volumes. - Kyiv-Chernivtsi: Bukrek, 2018. - T.2. - P. 105-170.
3. Bugayev A.F. The Code of New Civilization: Basics of Ecological Safety. - K.: "SPD Pavlenko" Publishing House, 2020. - P. 6-8.
4. <https://core.ac.uk/download/pdf/161260044.pdf>

Content of lecture

1. The environmental management system is a relatively new phenomenon in the world economy, which can be defined as a special management system aimed at preserving the quality of the environment, ensuring regulatory and legal environmental parameters and based on the concept of sustainable development. Environmental management and business safety Practical implementation of the principles of sustainable development in many ways determined by the organization and development of production and environmental systems management and environmental management.

A distinction is made between nature protection management and ecological management.

2. The center of activity and responsibility in the environmental management system is shifting from the industry minister to the board of directors, i.e. **towards corporate management**, as it has become established in world practice. Accordingly, environmental responsibility becomes one of the main principles of corporate management, which needs to be created as part of the general system of corporate environmental management.

3. Ecological marketing. The concept of marketing is that, in general, the achievement of the company's goals should be carried out by determining the needs of the target markets and ensuring the necessary satisfaction with more effective and ecologically safe means of production for the lives of people and nature than those of competitors. The main purpose of marketing, including ecological, - **improving the quality of life** (quality, quantity, assortment, availability, cost of goods, quality of the natural environment, quality of the cultural environment).

If the **ecological audit establishes a diagnosis of the ecological health** of the enterprise according to certain parameters, evaluates the possibilities of ecological improvement of the enterprise, offers "medicines", then ecological marketing "looks for" and provides the necessary technological and management "medicines", and **ecological engineering** determines the regimes of "treatment" or improvement of the life support systems of the enterprise. Such a comparison is quite conditional, but it shows the distribution of functions or spheres of influence of these three tools of the system-ecological approach to the modernization of the enterprise's production system in general.

Ecological engineering, or ecological engineering activity (ordinary engineering is an engineering and economic activity), aims at the technical and economic substantiation of a set of measures for ecological modernization of production with, if necessary, preliminary technological studies on pilot (experimental) equipment, for example, purification. Classic examples of environmental engineering are the assessment of the impact of the designed objects on the environment, the assessment of environmental risks as part of the design of organizational schemes. Environmental insurance. The main task is to compensate policyholders for losses arising as a result of accidental environmental pollution, additional financial support for environmental safety while respecting the interests of all parties to the contract, and reducing payments for pollution.

Environmental insurance creates a mutual economic interest of policyholders and insurance organizations in reducing the risk of environmental pollution. For the corporate management system, the strategy of environmental insurance with deductibles is attractive: if the insurance does not cover all the damage and the culprit himself suffers losses from a certain part of this damage (which is typical for Ukraine), then deductibles in the implementation of measures increase the profitability of the corporation or its individual enterprises. That is, the EU corporate system assumes (together with the insured) part of the insurance risk. In this case, the activities of environmental insurance in the direction of ecological modernization of production from involving three sources: 1) insurance payments (premiums), which are included in the cost of products or are included in environmental payments for pollution; 2) equity capital; 3) motivations for protecting the property interests of individuals and legal entities (forced economic and legal mechanism of responsibility).

Environmental management - the system of environmental management in the country is defined, formed and regulated by the Law of Ukraine "On Environmental Protection" adopted in 1991. According to this Law, the purpose of state management in the field of environmental protection is the implementation of legislation, control over compliance with environmental safety requirements, ensuring the implementation of effective measures for environmental protection and rational use of natural resources, achieving coordination of state and public bodies in the field of environmental protection.

An environmental audit is conducted to establish the actual environmental state of the enterprise, to determine deviations from the norms and requirements of current environmental legislation or international standards, and to propose measures to bring the enterprise's production activities into compliance with these requirements. Therefore, it is **a management tool** that systematically covers all issues of environmental assessment of the company's activities, improvement of the system of regulation of environmental impact and its investment attractiveness. The characteristic features of an environmental audit are its: high professionalism, independence, confidentiality, objectivity, systematicity, competence, licensure and compliance with the goals determined by the customer when concluding an audit contract.

According to international standards, an **environmental audit is an integral part of the environmental management system**. Eco-audit promotes effective implementation of environmental protection measures and coordination of actions of state and public bodies, local authorities and enterprises.

The eco-audit is organized at the initiative of the head or owner of the object and has the nature of environmental self-control. It is carried out independently of the state environmental examination. To carry out eco-audits, specialized auditing organizations that have the appropriate qualification certificate are involved. The scope of the eco-audit is the eco-management system of the enterprise, its production areas and the adjacent territory at a distance of 5 km along the perimeter, main and auxiliary technological processes, buildings and equipment.

Lecture No 8

Title: Ecosystem approach in ecology. The essence of the noosphere. Noospherogenesis.

Lecture Plan:

1. Types of biosphere ecosystems. Anthroposphere. Technosphere. Sociosphere. Noosphere. Mutual influence and critical limits.
2. Environmental crisis of modern times.
3. Teachings of Academician V.I. Vernadsky about the noosphere, conceptual and categorical apparatus.
4. Noosphere education and culture. Concept of development of noosphere education and culture.

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Content of lecture

1. The object of study of modern ecology is the ecosystem (EC): conditions and patterns of existence, formation and functioning of its various hierarchical levels. The term "ecosystem" was proposed in 1935 by the English geobotanist A. Tansley. By the ecosystem, A. Tansley meant a set of complexes of organisms with a set of physical factors, that is, factors of the place of residence in the broadest sense. According to Villa and Detier: an ecosystem is a natural unit that consists of a number of living and non-living elements, as a result of the interaction of these elements, a stable system is formed, where there is a **constant cycle of substances**.

The global EU is the biosphere. The term "biosphere" appeared in the era of great geographical discoveries. Zh.B. Lamarck called the biosphere the area of life and influence of living organisms. In 1875, E. Suess defined the biosphere as special hard shell of the earth's crust, where life is concentrated. The founder of the modern doctrine of the biosphere is V.I. Vernadskyi. The biosphere (Greek: bios - life, sphaira - sphere) is an area of active life that includes the upper part of the lithosphere, the hydrosphere and the lower part of the atmosphere. The biosphere consists of living (plants, animals and microorganisms), biogenic (coal, peat, detritus, humus, limestone), bio-bone (soil, water) and bone (rocks of inorganic origin) substances. The lower limit of the biosphere lies on average at a depth of 3 km from the land surface and 0.5 km below the ocean floor, and the upper limit is at a height of about 20 km above the Earth's surface. According to V. Vernadskyi, the biosphere transformed by human creativity and production should be transformed into the sphere of the mind - the "noosphere".

Analysis of the content of modern (non-Haeckelian) ecology clearly shows that the primary meaning of ecology has been lost. Ecology has been given a content that does not correspond to what E. Haeckel put into it. Based on this, from the point of view of V. Nekos, what is now called

"modern ecology" should be called "**neocology**", and for traditional ecology, the ecology as seen by E. Haeckel, the biological component should be left, that is, everything that ecology has been doing for more than 100 years.

2. An important ecological problem of Ukraine is the protection of groundwater. They are no less important for providing water to the population than surface runoff water. It is enough to note that about 70% of the population of urban-type cities and towns use water **from underground aquifers**, while the rural population meets its needs almost 100% from **groundwater (wells)** or deeper aquifers (**bores**).

Groundwater is spread throughout the territory of Ukraine. Seven main hydrogeological regions are highlighted here: Lviv-Volyn, Dnipro-Donetsk and Black Sea artesian basins, Carpathians, Donbass, Crimea and the Ukrainian crystalline shield (central regions of the republic). However, underground water reserves are extremely unevenly distributed across Ukraine.

In some industrial regions of Ukraine, such as Donbas, Kryvbas, the mining industry (mines, quarries) has had a negative impact on underground water reserves. Intensive multi-year pumping of water from these objects led to a significant **decrease in the level of groundwater**. Thus, near some large Kryvyi Rih quarries, depression funnels were formed, within which the level of underground water fell 300 m below the earth's surface, and water disappeared completely from some aquifers.

The quality of groundwater in Ukraine is generally better than that of surface runoff, although in some places there is also contamination of groundwater in some horizons with runoff from industrial enterprises, large livestock complexes, etc. This is mostly chemical pollution. In the Dnieper-Donetsk basin, fresh groundwater was also contaminated with mineralized water (due to high-quality cementing of oil wells), when the waters of some underground horizons were mixed with the waters of others (flows).

Groundwater is not only depleted and polluted, but also used irrationally. Current legislation prohibits the use of fresh groundwater for non-drinking purposes, but in 30 cities of the country more than half of the total amount of groundwater is used for technical needs.

Fresh water, necessary for the life and activity of mankind on the globe, is only about 3% of the total amount of water. Of them, only 1% is the water of reservoirs and rivers, and 2% is underground water and glaciers. This scarcity of fresh water is burdened by our mismanagement. In our country, water consumption is 1.5 to 2 times higher than in the developed countries of the West.

Clean air is another resource of human life that is in danger of being lost - these are plants that absorb CO₂ and release O₂ in the process of photosynthesis (forests on land, phytoplankton in the ocean). During one flight from Europe to America, the plane burns 50 tons of O₂. And how much of such equipment do we have?

The situation is further complicated by the fact that the **green world of the planet** is simply unable to process the gigantic amount of CO₂ that is emitted into the atmosphere every second by factories, boiler houses, heating plants and transport, as a result of which CO₂ and other greenhouse gases constantly accumulate in the atmosphere. This threatens to lead to the so-called "**greenhouse effect**", when CO₂ and other gas emissions form a kind of screen that reduces the reflection of energy, as a result of which the average air temperature rises. And this can lead to the gradual melting of glaciers and the flooding of a large part of the land with ocean waters. Nowadays, there are more than 500 million cars in the world. In addition, 1 ton of oil covers 6 km² of water surface with a solid film, and 1 liter of oil kills all living things in 40,000 liters of water. So you can imagine what a real threat is hanging over humanity now.

Lecture No 9

Title: Environmental situation in Ukraine and in the world.

Lecture Plan:

1. Natural resource potential of life activity and the limits of its use: energy, biological, water, land, mineral, recreational resources.
2. Concept of national environmental policy. Challenges and threats to the national security of Ukraine in the environmental sphere and priority measures for their neutralization.

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Content of lecture

1. At the International Environmental Conference held in Rio de Janeiro (1992), the words were said: "The first thing humanity should do is to form **a new ecological mindset** in every person. At a minimum, for this purpose, it is necessary to allocate several billion dollars for appropriate environmental education for everyone - from children to pensioners, to introduce appropriate courses on ecology in schools, universities, especially technical ones. All technical solutions should be considered, first of all, from the ecological side: how to minimize the harmful effects of the implemented technology, what kind of raw materials to target the new technology in order to disrupt the natural balance as little as possible, how to provide for the consistent processing of production waste to make the technology waste-free, etc.

It becomes clear that the further development of technology in this direction, in which it is going until the last time, will lead to the death of the world. And that is why more and more voices are being heard to stop and conserve technical development. But, on the other hand, without further technical development cannot cope with the environmental consequences that we have today.

In the late 60s of the XX century a crisis begins in society regarding the prospects of humanity. In 1972, prominent ecologist D. Meadows and a group of colleagues published pessimistic assessments of the further technical development of mankind. According to Meadows, previously developed resource forecasts were based on linear extrapolation and did not take into account the exponential growth of their consumption for the future. Thus, **the threat of energy hunger and global environmental pollution looms over the world**. Until the end of the last century, the power of natural photochemical processes made it possible to process all pollution introduced by man. But now the natural processes of restoring the balance are broken.

The Club of Rome is an international non-governmental, non-commercial organization that unites in its ranks businessmen, politicians and scientists from several dozen countries of the world, which is engaged in substantiating the prospects for the development of humanity. The Club of Rome was founded more than 40 years ago, in 1968, on the initiative of the outstanding Italian economist and entrepreneur Dr. Aurelio Peccei [15]. As of 2009, the Club of Rome had 68 active members from over 30 countries, as well as 35 associate members, including citizens of Ukraine. They actively support the solution of demographic problems (economic, social) and the rational use of natural resources.

The Club of Rome developed several models based on the extrapolation of existing trends in population growth and the depletion of known reserves of natural resources. According to the standard model, if there are no qualitative changes, then at the beginning of the 21st century, there will first be a sharp decline in per capita industrial production, and then in the number of the planet's population. Even if the amount of resources doubles, the global crisis will only be postponed until about the middle of the 21st century. The only way out of the catastrophic situation was the **transition to the development planned on a global scale according to the model of global balance (in fact - "zero growth")**, that is, the conscious conservation of industrial production and population, as well as the model of the development of the world economy with an annual increase in the productivity of resources by 4%.

However, it should not be assumed that by the 20th century there were no examples of fatal human intervention in natural processes. Here you can recall at least the legend about King Solomon, who decided to glorify himself in the ages by building an unseen temple of Lebanese cedar. This temple was built, but the Lebanese cedar mostly now remains only on the state flag of Lebanon.

2. Analyzing the anthropological crisis that faced humanity at the turn of the millennium in all its manifestations, globalists emphasize the need overcoming age-old human selfishness, ignorance, carelessness, market element and unprofessionalism and irresponsibility of politicians [11]. Each of these fundamental problems has a more than obvious environmental context. In this connection, the problem of the formation of ecological competence, ecological consciousness of a person of the XXI century becomes extremely urgent.

One of the main means of **forming the ecological consciousness** of our contemporaries should be the system of ecological education and ecological upbringing. Therefore, the problem of organic involvement of the ecological component in the general educational process and a significant increase in its didactic load has arisen so urgently. Science can influence the formation of consciousness only through the education system. A fundamental circumstance that must be taken into account is that ecology as a scientific discipline is a specific, ambiguous and extremely difficult subject to be involved in the educational process. **Environmental education is designed to form a new worldview and a new way of life for a person of the third millennium**, which includes the principles of both rational nature use and effective social practice in the broadest sense of the term. Environmental education cannot be limited to the understanding of abstract truths, but must be oriented towards their assimilation and "experiencing".

Environmental education should not stop at the stage of simple awareness, but proceed to complex and eternally problematic processes of education, purposeful formation of personality. Obviously, this path is not easy. A lot depends on the availability and quality of environmental information, its presentation and direction.

For the formation of an appropriate level of ecological consciousness, it is fundamentally important to teach a person to think taking into account his genetic connection with the world. Ecology is much more than a discipline. Therefore, environmentalization of education is not just concern for the subject of ecology, it is a guarantee for the graduate of adequate development and socialization, and not just a certain amount of knowledge. And socialization requires finding the intersection of social, natural and spiritual factors in modern human life.

For the development of effective environmental strategies and the formation of adequate environmental awareness, a solid scientific basis is necessary, in particular, the integration of the achievements of natural science and socio-humanitarian knowledge into a single conceptual whole. Such an approach, there is hope, will contribute to overcoming declarativeness and fragmentation of educational programs in the field of ecology.

Anthropomorphic specificity of ecological knowledge, where it is not important just information about the state of the environment, but also the **assimilation of ecological truths** by an individual, makes it an extremely interesting subject field of research for a wide range of specialists, whose efforts are currently creating a new vision of the essence of the cognitive process. These characteristics are important in the process of forming ecological consciousness. Therefore, it is in ecology that the actualization of the concept of "living knowledge", "new naturalism", the **hermeneutic opposition of knowledge and understanding is found**.

There are several points of view regarding human perception of nature.

Anthropocentrism (human-centrism) is a fundamental worldview orientation of the human race, an eternal conviction that it is man who is the center and the highest goal of the universe. The universe was created specifically for man and all its fragments and processes are configured to meet his needs. Of course, not all of the numerous forms of anthropocentrism were so overt, however, even in the most moderate versions, this attitude always took place. Nowadays, against the background of the obvious disproportion, between the more than obvious progress of science and technology and the stagnation of ideas about morality and the harmonious development of society, humanity has stopped before the alternative: change or disappear. Man has developed an insatiable appetite for consumption and possession, producing more and more, drawing himself into a vicious circle of growth that has no end in sight.

Another point of view is **biocentrism** - the perception of all living things, all fragments of the Earth system as having value in themselves, regardless of human interests. Representatives of biocentrism believe that we live in a world of interdependent, competing organisms. Our moral and political ideals cannot be limited to the interests of society, which must finally realize the problem of its responsibility to animals and plants. One method of explanation should not be applied to human society, and another to "subhuman" society. It is paradoxical that we reject slavery, cannibalism and murder and, at the same time, justify domestication, our own carnivory and hunting. Everything that exists in nature has its own value and right to exist. **The founder of ecocentrism, O. Leopold, wrote about the need to extend moral and ecological principles from individual living beings to ecosystems. Our planet is not a storehouse of raw materials, but a living entity.**

Lecture No 10

Title: The history of the development of the relationship between nature and society

Lecture Plan:

1. Stages of development and interaction of nature and society. Material and energy exchange between society and nature.
2. Impact of urbanization, industrialization and chemicalization of the national economy on the natural environment.

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Content of lecture

1. Territorial, linguistic and economic unity is characteristic **at the stage of nation formation**. In its further existence, an important role belongs to mental components - established national self-awareness, features of national psychology and national character, devotion to national symbols and values. We observe all this in independent Ukraine. **A. Toynbee** in his work "Comprehension of History" considers the development of society as the mutual influence of internal and external factors. In his opinion, every civilization arises as a response, a response to the challenge of the environment. Moreover, according to Toynbee, the environment is dual in essence - social and natural. Therefore, it is a source of both natural and human challenges. As a postulate, the scientist formulates the law of compensation of natural and human challenges. Its meaning can be formulated as follows: an excessively strong challenge from the environment is compensated by the weakness of the Challenge from the human side. Conversely, it is quite possible that the life of a nation is combined with such a dynamic combination of natural and social factors, which is unique and allows the nation to maintain its internal stability.

Lev Gumilyov presents the second in his theoretical considerations direction of substantiating the role of natural factors in the formation of ethnos. In his theory of **ethnogenesis**, ethnos is not so much the result of the historical process of development of human communities, but rather the result of contacts and connections of these communities with nature and the environment. L. Gumilyov believed that, firstly, "behavior" is the main, defining feature of the ethnos and, secondly, it - the behavior of the ethnos - is determined by the landscape - the place on the planet where the ethnos formed and defined itself. According to L. Gumilyov, the driving force of ethnogenesis is not so much social production as **a specific type of energy**. Its source is radiation fluctuations of cosmic origin. When they fall into certain geographical areas where people live, they create the effect of the so-called "passionate explosion". The search for optimal solutions to the ecological crisis, optimal forms of human activity in nature require not only perfect knowledge. According to L. Gumilyov, ethnic groups, like animal populations, live at the expense of energy

exchange with nature. And at the same time, they support or disrupt the balance of energy balance. A passionate explosion is an excess of energy that people get. It forces them to actively act in the direction of expansion, that is, to expand the zones of their living space. Stages of ethnogenesis are phases of gradual fading of the energy that arose from the initial impulse. L. Gumilyov believes that this impulse is enough for an average of 1,200 - 1,500 years. And, accordingly, this is the period of existence of the ethnos. During all this time, the connection with the landscape is an essential characteristic of the ethnic group, because a tangible change in the landscape determines the end of the existence of the given ethnic group.

Thus, on the basis of natural-scientific ethnology, **ethnos is defined as a category of nature, not history or culture.** According to the definition of L. Gumilyov, ethnos - a group of people that arose naturally on the basis of an original stereotype of behavior. This collective exists as an energy system, which opposes itself to all other, similar collectives, based on a sense of complementarity. The term "feeling of complementarity" indicates the nature of ties between members of the ethnic community. It is based on a genetic attraction between people who have a common stereotype of behavior. L. Gumilyov substantiates the existence of both symbiotic ties of ethnic groups, which are manifested as friendship, benevolence in the contacts of ethnic groups, and negative complementarity, which manifests itself in the existence of "ethnic chimeras".

Over the centuries, man has accumulated and improved scientific, intellectual, and technical-technological capabilities to realize his goals in nature. But already from the middle of the XIXth century, at the level of scientific consciousness it becomes obvious that the existing forms of nature management, which were based on conquerors whose attitudes towards nature have **caused excessive technogenic pressure on the environment, which will lead to an ecological disaster in a very short time.**

V. I. Vernadsky was optimistic about the question of positive human opportunities in nature management. However, he warned that not every transformation of nature can produce a lasting positive result. Of course, you can turn a primeval forest into a cultivated one, a forest into a garden, a dune in a forest zone into a forest. But it is guaranteed to turn, say, the steppe into a forest for a long time a person cannot. It cannot because after some time the reverse process will begin and all efforts will be aimed at resisting the "onset" of natural processes.

2. The increase in the production of industrial goods and food contributes to the growth of the number of people on Earth, which led to an increase in needs, and this little new growth in production volumes. Thus, the world economy - **social emerged system, fundamentally aimed at unlimited growth.** The result of this was the threat of an imbalance not for individual ethnic groups, but for all of humanity with the biosphere - the living shell of the Earth, beyond which a person cannot exist. The influence of technical civilization on various components of the biosphere and the system of connections between them has reached a level that is already equal to the own fluctuations of biosphere processes, and this has already begun to change their course. The interference of human activity in the exchange of substances and energy, in natural biogeochemical cycles leads to global changes. Their scale is becoming threatening, therefore the study of directions of development of disturbances of biosphere processes, the forecast of their dynamics, which was first made in the models of the Club of Rome, is the main content of global ecology. Different ecosystems, depending on the complex of climatic, geological, geomorphological and other conditions, have different productivity. At the same time, the very real danger of the destruction of the ozone layer of the atmosphere, threatening the increase in the number of genetic and cancer diseases, dangerous infectious diseases, is of so little concern to most people that few people will

give up aerosol cans in their everyday life. Namely, freon, which is emitted from them together with deodorant, varnish, paint, is the main ozone "destroyer". Gradually, the word "ecology" entered the everyday lexicon of broad sections of the population. Under the word ecology, they began to understand not the science of complex natural systems, but some "set of rules about the cleanliness of the environment" - the cleanliness of air, water, food and other indicators of the state of the environment. Having united due to the logic of its own development with the science of the biosphere, ecology has included in its sphere of interests the problems of the impact of human activity not only on individual ecosystems, but also on the biosphere as a whole. This is how the section of ecology was formed, which actually became **an independent science - global ecology. The main problem of humanity's survival, depending on its ability, is to take control of the development of biosphere processes.**

Lecture No 11

Title: International environmental right. International environmental forums, their decisions.

Lecture Plan:

1. Norms and institutions regulating relations between subjects of international right in the sphere of their interaction with the surrounding natural environment.
2. Main directions of international legal regulation in the field of international environmental relations.

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Content of lecture

1. International environmental right is a branch of modern international law that unites the principles and norms of international law that regulate the relations of its subjects in the field of environmental protection and rational use of its resources. A serious threat to health is **the depletion of the ozone layer**, which protects against the harmful radiation of the Sun. Catastrophic changes in the Earth's climate are caused by the "**greenhouse effect**", that is, global warming as a result of increasing emissions of carbon dioxide into the atmosphere. Irrational use of mineral and living resources leads to their depletion. Accidents at enterprises involving radioactive and poisonous substances, not to mention the testing of nuclear weapons, cause enormous damage to human health and nature.

In 1972, the participating states held the first World Conference on the Environment under the auspices of the United Nations and adopted the Declaration on the Environment, where they

declared: "Man has the right to freedom, equality and adequate living conditions, to an environment of such quality that makes it possible to live with dignity and well-being."

On October 28, 1982, the UN General Assembly resolution 37/7 approved the **World Charter of Nature**, where the importance of environmental protection was once again emphasized in this most important international document. In particular, the mentioned resolution stated: humanity is a part of nature and life depends on the continuous functioning of natural systems, which are a source of energy and nutrients. **In June 1992, the second UN Conference on the Environment was held in Rio de Janeiro**, in which 178 countries participated. The conference adopted the **Declaration entitled "Agenda for the XXI century"**, as well as a special resolution on the principles of cooperation between states in this field.

In 2012, the UN World Summit on Sustainable Development was held in Johannesburg, which was attended by representatives of 195 countries, including presidents and prime ministers. During the Summit, its participants adopted the **Political Declaration of the Forum**, which calls on all countries to work for the benefit of general prosperity and peace. Also, the Action Plan to fight against poverty and protect the earth's ecology was adopted, which provides for a number of large-scale actions that provide access to hundreds of millions of people to clean water and electricity. The plan stipulates complex environmental protection programs that slow down deforestation and the depletion of fish resources in the world's oceans. The plan also envisages a global reduction in subsidies for the extraction of energy-bearing minerals, the transition to renewable energy sources. The Summit in Johannesburg, with its decisions and obligations imposed on countries, once again emphasized the enormous importance of global agreements on the problems of life support for the planet's population.

Current international legislation does not sufficiently protect the near-Earth outer space (NES). In the main **Outer Space Treaty (1967)**, the only provision related to ecology (Article 9) contains only requirements for the protection of other celestial bodies and the prevention of the introduction of harmful substances from them to Earth. According to this Treaty, the states are obliged to: carry out activities in outer space, on the Moon and other celestial bodies with certain consideration of the interests of other states; conduct their study and use in such a way as to prevent harmful pollution, as well as unfavorable changes in the Earth's environment due to the delivery of extraterrestrial substances; hold international consultations if activities and planned experiments could create potential damage to the world space activities of other states.

It is possible that the general nature of the provisions of the Space Treaty had a positive side, as filling it with a more specific content at that time could later come into conflict with the practice of developing space activities. But now, when humanity sees the consequences of 70 years of space activity and its impact on the NES, the ecology of the Earth's biosphere, the health and life of the citizens of the planet Earth, this Treaty no longer corresponds to modernity and requires specific changes to its provisions. Similarly, this applies to the Agreement on The month of 1979.

Among other international agreements, the "Agreement on the Rescue of Cosmonauts" should be noted (1968), "Convention on Registration of Objects Launched into Outer Space" (1976), "Convention on International Liability for Damage Caused by Space Objects" (1972). A brief review of international documents shows that the legal norms related to ensuring the environmental safety of space activities are completely imperfect. They lack general principles of protecting the space environment and specific actions for their implementation.

At present, the UN Committee on Outer Space (COPUOS) should play a key role in the international aspects of the study and peaceful use of NES. But this Committee focuses its activities

on strengthening international cooperation in space research; on the promotion of the use of the results of space research in developed countries and the expansion of monitoring of the earth's surface by space means. The real step initiated for the protection of space technology, which is related to the protection of NES, was the Directive of the President of the United States of February 11, 1988 on the reduction of space debris. This Directive influenced the development in 1993 of NASA's Special Guidance on Policy for Limiting the Generation of Orbital Debris.

2. Currently, organizations of the UN system implement more than 200 projects and programs related to space activities. The UN General Assembly annually adopts a resolution on international cooperation in space, considering its political-legal and scientific-technical aspects. In the report of the Committee for Outer Space Research (COSPAR), the International Council for Science (ICSC) and the International Astronautical Federation, it was noted that there are more than 3.5 billion man-made space bodies, larger than 1 mm in size, with a total weight of 5,000 tons, orbiting the Earth. In 1993, the Interagency Coordinating Committee on Space Debris was created to coordinate actions and monitor space debris, which performs the functions of holding international annual forums. The following countries take part in its work: Great Britain, Germany, Italy, France, China, Russia, Ukraine, USA, India, Canada, Japan, as well as the European Space Agency (ESA). In the last period, the UN Legal Committee on Outer Space was given an order to prepare a Declaration on the principles of preventing the occurrence of space debris, which would have a legally binding nature. But this issue is constantly postponed, because at the moment no consensus has been reached.

The main goals of the Interagency Committee on Space Debris (IASD) are: exchange between space agencies of information related to research on the problem of space debris; promoting cooperation on space debris issues and tracking the results of joint activities; determination of possibilities for reducing space pollution. In addition, the International Space Station: monitors general joint activities on the study of space debris; recommends new opportunities for cooperation; provides a primary tool for sharing information and planning research related to orbital debris; identifies and evaluates opportunities to reduce clogging.

Lecture No 12

Title: International environmental organizations.

Lecture Plan:

1. United Nations Educational, Scientific and Cultural Organization (UNESCO). United Nations Environment Program (UNEP), Food and Agriculture Organization of the United Nations (FAO), World Meteorological Organization (WMO), International Union for Conservation of Nature (IUCN), World Wildlife Fund (WWF),
2. Global Ecolabel Network (GEN), Global Environmental Fund (GEF), Greenpeace.

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Content of lecture

1. The UN is at the head of eco-cooperation. For the first time, the idea of the need for international cooperation in the field of environmental protection was voiced **in 1913 at the First International Conference on Environmental Protection (Bern)**. In reality, these ideas began to be implemented only in the second half of the 20th century, in particular after the active use of various types of weapons, including chemical, biological and nuclear weapons, during the Second World War. The leading role in this process belongs to **the UN**. In 1972, **the United Nations Environment Program (UNEP)** was developed within the framework of the UN. This program is a special international mechanism for coordinating the cooperation of states in the field of environmental protection.

UNEP promotes the implementation of the environmental protection component of sustainable development within the framework of the UN system, consistently advocates for the protection of the natural environment of the globe, often sponsors and promotes the implementation of projects related to ecology, plays a significant role in the development of international conventions in the field of ecology and environmental protection. With the support and active participation of UNEP, dozens of documents were developed and adopted, the most recent of which are: the Stockholm Convention on Persistent Organic Pollutants of 2001, the International Agreement on Trade in Tropical Timber of 2006, and the Paris Charter on Climate Change - the final document of the 21st Conference of the Parties to the UN Framework Convention on Climate Change in 2015.

In September 2015, as part of the 70th session of the UN General Assembly, a **UN Summit was held in New York to adopt the Post-2015 Development Agenda**. During this meeting, the leaders of **193 countries adopted 17 global Sustainable Development Goals for 2016-2030**. Among them, 7 relate to environmental security issues, in particular: clean water and sanitation; renewable and inexpensive energy; ecologically clean cities and communities; responsible use of resources; combating climate change; safe use of oceans; safe land use.

Certain international non-governmental environmental organizations are quite influential in the world. In particular, the World Wildlife Fund (WWF), Greenpeace, the World Society for the Protection of Animals (WSPA), the International Green Cross, the International Union for Conservation of Nature (IUCN), etc.

Created in 1961, the **World Wildlife Fund (WWF with a giant panda on its logo)** takes measures to protect rare animals, actively participates in the development of agreements on the protection of forests, seas and fresh water. Every year, WWF implements more than 1,200 environmental projects, drawing the attention of millions of people to the problems of environmental protection and their solutions. Among the WWF projects, it should be noted the annual international action "Earth Hour", in which Ukraine has been participating for several years in a row with the support of state bodies.

The independent international organization "**Greenpeace**" was established in 1970. Its goal was to organize actions to prevent the degradation and destruction of both regional and global ecosystems. "Greenpeace" has set such a pace in solving environmental issues that, in fact, other environmental organizations of the world are equal to it. This organization really has a significant influence, for example, in February 2016, the highest environmental protection body in Colombia, under the pressure of local communities and Greenpeace Colombia activists, had to prohibit the multinational mining company Hunza Coal from abandoning part of its work in the páramo. And that's not all. Colombia's Constitutional Court canceled all 347 coal mining licenses in the region.

2. The Global Ecolabelling Network (GEN) is an association of independent organizations from 36 countries implementing ecolabelling systems in accordance with the voluntary international

standard ISO 14024. GEN closely cooperates with the World Trade Organization, and one of its members is the Commission of the European Community on Environmental Certification and Labeling. Robin Taylor is the Chair of the Global Ecolabel Network.

Ukrainian environmental labeling program. The Ukrainian environmental mark "Ecologically clean and safe" was included in the international register on October 8, 2004 at the official annual meeting of GEN member organizations held in Tokyo. At the same time, the Ukrainian Environmental Labeling Program was recognized. In 2011, the Ukrainian environmental labeling program passed an international audit and received a certificate under the "GENICES" mutual recognition program. The audit took place on May 3 and 4, 2011 on the basis of the environmental labeling body, which has been administered by the All-Ukrainian public organization "Living Planet" since 2003.

Lecture No 13

Title: Environmental organizations of Ukraine.

Lecture Plan:

1. National Ecological Center of Ukraine (NECU), Ukrainian Ecological Association "Green World", Ukrainian Society for Nature Protection (UkrTOP), Youth Ecological Center (MEC), Kyiv Ecological and Cultural Center (KEKC), Institute for the Development of Territorial Communities (ICDU), "Green Front", EcoClub "Green Wave", Dnipropetrovsk City Nature Conservation Society, Carpathian EcoClub "Ruteniya", Molod izhna Ecological League of Dnieper, All-Ukrainian Ecological League.

References:

1. www.ecoleague.net/diialnist/spivpratsia/hromadski-orhaniza
2. https://ucn.org.ua/?page_id=44
3. <https://naurok.com.ua/prezentaciya-na-temu-mizhnarodni-ta-ukra-n>
4. <https://ecoaction.org.ua/>
5. <https://necu.org.ua/>

Content of lecture

Gaps in the legislation, which prevent the increase of the area of the nature reserve fund, and how to correct them

Some of the changes proposed in this document are part of more systemic reforms, such as the recognition of the Emerald Network at the national level and the creation of the Ukrainian Climate Fund at the expense of revenues from the eco-tax for greenhouse gas emissions, which was declared by the previous leadership of the Ministry of Environment. Moreover, the rates of such a tax should increase significantly in the coming years, taking into account the trends in the climate legislation of the EU. Therefore, it is worth intensifying the work of the public regarding the advocacy of already existing legislative initiatives (for example, the adoption of Law No. 4461 "On the territories of the Emerald Network"). It is also worth starting a broad advocacy campaign for the creation of NRF (natural reserve fund) in the temporarily occupied territories, with the participation of mass media, scientists, the public, opinion leaders, including environmentalists in the ranks of the Armed Forces.

Regarding the rest of the points proposed by us, it is suggested to prepare a separate draft law, present it to the deputies of the environmental committee of the Verkhovna Rada of Ukraine and try to get their support.

Всесвітній фонд природи

- **Всесвітній фонд дикої природи** (англ. World Wide Fund for Nature), — міжнародна неурядова організація, що займається збереженням природи, дослідженнями та відновленням природного середовища.
- **Головна мета** — зупинити деградацію природного середовища планети та побудувати майбутнє, в якому люди будуть жити гармонії з природою.
- **WWF працює в Україні з кількома проектами:**
 - Дунайський проект
 - Карпатський проект
 - Проект «Лісова сертифікація»



All-Ukrainian Environmental League: 25 years for the preservation of the environment The All-Ukrainian Environmental League is a public organization that was founded on December 12, 1997.

The purpose of VEL activity is:

- improving the environmental situation in Ukraine, forming a new environmental outlook, ensuring the environmental rights of citizens;
- formation of principles of balanced (sustainable) development in Ukraine;
- building a civil society in Ukraine based on universal human values and principles of environmental ethics;
- protection of legitimate ecological, social, economic and common interests of VEL members.
- expansion of public participation in the formation and implementation of national environmental policy, submission of proposals to authorities and management on improving environmental legislation;
- influence on the formation of state and local plans, budgets, development programs, which are of decisive importance for the stabilization and improvement of the ecological situation, ensure the

protection and reproduction of the environment, biological diversity and the health of the citizens of Ukraine;

- promoting the integration of the ecological component into all sectors of social life and economy;
- organization of public control over the implementation of environmental legislation;
- organizing and conducting activities aimed at stopping activities that threaten ecological safety, biological diversity, and the health of Ukrainian citizens;
- promoting the formation of environmental awareness by promoting knowledge about the state of the environment, increasing the level of environmental education and culture of citizens, supporting education in the interests of balanced (sustainable) development;
- promoting the development and implementation of domestic ecologically balanced, energy- and resource-saving technologies in all areas of economic activity.

VEL contacts:

Address: St. Saksaganskoho, 30-B, office 33, Kyiv, 01033

Phone/fax: 044 289-31-42

The initiative "Evaluation of the implementation of environmental policy in Ukraine" is implemented within the framework of the project "Supporting the activities of the Ukrainian national platform of the Civil Society Forum of the Eastern Partnership 2021-2023", which is implemented by the Institute of Economic Research and Political Consultations with the financial support of the European Union.

The initiative will be implemented during June-September 2023 with the participation of the **National Ecological Center of Ukraine**, RAC "Society and Environment", MBO "Ecology-Law-Human", MBO IC "Green Dossier", as well as independent expert Anna Golubovska-Onisimova, representing Working Group 3 "Environment, Climate Change, Energy Security" of the Ukrainian National Platform of the East Civil Society Forum partnership.

What is the initiative about? Contrary to the established opinion that in order to join the EU, Ukraine must adapt and implement only EU legislation, in fact this process also applies to EU policies, in particular environmental and climate policies, the most ambitious of which is the European Green Deal (EGD). Ukraine undertook to publish an annual report on the implementation of environmental policy, which is provided for by the Law of Ukraine on the State Environmental Strategy until 2030 (2019). However, such a report has never been prepared. In general, reports on the implementation of the state environmental policy in Ukraine have not yet been prepared, only on the state of the environment. As a result, there is no substantiated position regarding the state, dynamics, shortcomings and achievements, and in general, the effectiveness of Ukraine's environmental policy in achieving the set goals. Accordingly, there is no constructive dialogue between the authorities and public structures (PS) regarding the development of environmental policy, its improvement and priorities. This problem has become particularly acute in light of the upcoming EU accession negotiations, in particular with regard to Chapter 27 "Environment and Climate Change".

The goal of the initiative is to assess the current state of Ukraine's environmental policy in the light of preparations for the start of negotiations on EU membership under Chapter 27 "Environment and Climate Change".

Title: Ecological component of environmental safety. Problems of preservation of natural and artificial systems.

Lecture Plan:

1. State system of ecological safety and its components.
2. Principles of environmental safety and main criteria.

References:

1. Bilyavskiy G.O., Butchenko L.I. Basics of ecology: theory and practice. Education manual - K.: Libra, 2006. - P. 49-59.
2. Heinrich D., Gergt M. Ecology: dtv-Atlas: trans. from the 4th German kind. / Artist Rudolph and Rosemary Fanert; of science ed. trans. V.V. Serebryakov - K.: Znannia-Press, 2001. - P. 60-81; P.260-266.
3. Bugayev A.F. The Code of New Civilization: Basics of Ecological Safety. - K.: SPD Pavlenko Publishing House, 2020. - P. 355-416.

Content of lecture

1. Environmental safety is such a state of the environment, in which it becomes impossible for the deterioration of the ecological state and the occurrence of danger to human health. Environmental security is a component of national security that ensures the protection of the vital interests of man, society, the environment, and the state from real or potential threats created by anthropogenic or natural factors in relation to the environment.

The state system of ecological safety is understood as a set of state measures (legal, economic, technical, humanitarian and medical) aimed at maintaining the balance between its ecosystems and anthropogenic and natural loads. The environmental safety system is created and developed in accordance with the Constitution of Ukraine, decrees of the President of Ukraine, Government resolutions, and state programs in this area.

Environmental safety is:

- A set of actions, states and processes that do not directly or indirectly lead to serious damage (or threats of such damage) to the natural environment, individual people and humanity in general;
- A complex of states, phenomena and actions that ensure ecological balance on the Earth and in any of its regions at a level to which humanity is physically, socio-economically, technologically and politically ready (can adapt without serious damage).

Environmental safety can be considered in global, regional, local and conditionally point boundaries, including within states and any of their subdivisions. In fact, it characterizes geosystems (ecosystems) of different hierarchical ranks - from biogeocenoses (agro- and urbocenoses) to the biosphere in general. Environmental safety is limited by the time and size of the actions carried out within it: a short-term action can be relatively safe, and a long-term one - dangerous, local changes are almost harmless, and large-scale - fatal. **Ecological safety** is a combination of certain properties of the environment and conditions created by purposeful human activity, under which, taking into account economic, social factors and scientifically based permissible loads on biosphere objects, the anthropogenic impact on the environment and the negative changes occurring in it are kept to the minimum possible level of risk, the health of people's vital activities is preserved, and the remote consequences of this impact for current and

future generations are excluded . The issues of preserving the gene pool of humanity, survival, ensuring the right to life and a favorable natural environment became the first priority.

The constituent elements of eco-safety are:

"environmentally friendly products" - materials or products (for food and technical purposes) that do not have harmful impurities in concentrations dangerous for the natural environment, animals, plants and humans (in contrast to red sausage, soy concentrate, resins in cigarettes, the use of Coca-Cola, genetically modified food products, food raw materials containing food additives, etc.);

"ecologically clean soils" - which do not contain impurities in quantities that threaten the soil biocenosis and human health (radiation contamination of soils, chemical contamination of agroecosystems, land reclamation, acid precipitation, smog, etc.);

"environmentally clean production" means ensuring such a level of production organization that ensures compliance with environmental requirements, norms and standards.

The objects of environmental safety are everything that is vitally important for security subjects: rights, material and spiritual needs of the individual, natural resources and the environment as the material basis of state and social development.

Subjects of environmental safety are the individual, society, biosphere, and the state.

Safety in the use of nature is a set of conditions that ensure the minimum adverse impact of nature and its technological processes mastery over people's health. Safety in nature management is considered within all forms of sectoral nature management and in the area of direct and indirect impact on humans (global, regional and local).

2. Principles of environmental safety: – the principle of unconditional primacy of security; – the principle of systemic environmental safety; – the principle of non-zero (acceptable) risk; – the principle of the inalienable right to a healthy environment; – the principle of internationalization of environmental safety; – the principle of equal environmental security of every person and every state; – the principle of payment for risk; – the principle of voluntariness; – the principle of freedom of environmental information; – the principle of legal risk regulation; - the principle of compromise between generations.

The main criteria of environmental safety:

- **individual** (medical or sanitary-hygienic) – designed to limit the impact of negative factors on a person;
- **genetic** - intended to preserve the gene pool and limit the increase in the frequency of genetic diseases in the first and/or subsequent generations;
- **social** - intended to limit the effect of a dangerous factor on groups of individuals;
- **psychological** - reflect the degree of perception/non-perception by society or a group of individuals of the level of man-made or natural-man-made risk;
- **economic** - designed to ensure balanced long-term economic development;
- **technical** - designed to limit the occurrence of accidents and disasters;
- **biological** - designed to preserve biotic diversity;
- **ecological** - designed to limit the negative impact of processes in order to preserve the structural stability of ecosystems;
- **landscape and geographical** - criteria limiting the negative environmental impact on catchment basins, soils and other geographical elements;
- **resource** - designed to limit and regulate the intensive use of renewable and non-renewable natural resources;

- **political and informational** - provide awareness and participation of the population in the decision-making process regarding potentially dangerous technologies, access to any information regarding these technologies.

Lecture No 15

Title: Ecological component of environmental safety. Problems of preservation of natural and artificial systems..

Lecture Plan:

1. Characteristics of natural and artificial systems. Ecosystem regulation.
2. Features of the functioning of natural and artificial systems.

References:

1. Bilyavskiy G.O., Furduy R.S., Kostikov I.Yu. Basics of ecology: Textbook, 2nd ed. - K.: Lybid, 2005. - P. 112-134.
2. Heinrich D., Gergt M. Ecology: dtv-Atlas: trans. from the 4th German kind. / Artist Rudolph and Rosemary Fanert; of science ed. trans. V.V. Serebryakov - K.: Znannia-Press, 2001. - P. 60-81; P.260-266.
3. Bugayev A.F. The Code of New Civilization: Basics of Ecological Safety. - K.: SPD Pavlenko Publishing House, 2020. - P. 355-416.

Content of lecture

1. **The term "ecosystem" (ES) was proposed in 1935 by the English geobotanist A. Tansley.** By the ecosystem, A. Tansley meant a set of complexes of organisms with a set of physical factors, that is, factors of the place of residence in the broadest sense. According to Willi and Detier: an ecosystem is a natural unit that consists of a number of living and non-living elements, as a result of the interaction of these elements, a stable system is formed, in which there is a constant cycle of substances.

The global ES is a biosphere. The term "biosphere" appeared in the era of great geographical discoveries. Zh.B. Lamarck called the biosphere the area of life and influence of living organisms. In 1875, E. Suess defined the biosphere as a special hard shell of the earth's crust where life is concentrated. **The founder of the modern doctrine of the biosphere is V.I. Vernadskyi. The biosphere (Greek: bios - life, sphaira - sphere) is an area of active life that includes the upper part of the lithosphere, the hydrosphere and the lower part of the atmosphere.** The biosphere consists of living (plants, animals and microorganisms), biogenic (coal, peat, detritus, humus, limestone), bio-bone (soil, water) and bone (rocks of inorganic origin) substances. The lower limit of the biosphere lies on average at a depth of 3 km from the land surface and 0.5 km below the ocean floor, and the upper limit is at a height of about 20 km above the Earth's surface. Transformed by creativity and human production activity, according to V. Vernadskyi, the biosphere should be transformed into **the sphere of the mind - the "noosphere"**.

2. **The ES structure** is the regular connections and certain distribution of various elements in the system, or, according to M. Reimers, it is the natural functional-morphological division of the ecosystem into subsystems and blocks that play the role of "bricks" in the EC.

There are three types of ES structure: species, spatial and trophic.

The species structure of ES is determined by the totality of living organisms included in this ES. **Living nature of EC is called biocenosis (author of the term D. Mobius) or biome. Biota**, unlike biome, does not imply ecological relationships between species. Biocenosis is not an independent system, it is a biological component of biogeocenosis. Animal world of biocenosis - zoocenosis of vegetation - phytocenosis of microorganisms - microbocenosis. **A space occupied by a biocenosis that is relatively uniform in terms of abiotic factors of the environment is called a biotope.** Biotope components: soil, water, air, physical and chemical characteristics. Similar biotopes are combined into biochores. The set of environmental conditions created by the soil is called an edaphotope.

Ecotop – the habitat of groups. The latter is very close to the biotope, but with an emphasis on factors external to the grouping of the environment. In 1964, V. Sukachev proposed the concept of **biogeocenosis - a set of homogeneous natural phenomena on a certain territory of the Earth's surface with its own specificity of interaction of its components, a certain type of exchange of substances and energy between themselves and other phenomena that are in constant motion and development.**

The placement of species is not chaotic, but strictly ecological: each occupies its own ecological niche. **Ecological niche (French - chamber, cell)** - the position of a species in nature, which includes not only the place of the species in space, but also its functional role in the group. An ecological niche is not an address, but a profession. Different ES have different species composition, but ecological niches can be the same.

Species that predominate in number are called **dominants**. However, not all dominant species affect the biocenosis in the same way. Among them, those that, by their life activity, create the environment for the entire group to the greatest extent and without which the existence of most other species is impossible. Such types are called **edifiers (Latin – builders)**.

Lecture No 16

Title: The world's most significant environmental disasters.

Lecture Plan:

1. Causes, consequences and the role of the human factor in the occurrence of hazards. Accident at the Chornobyl NPP. International scale of nuclear events.
2. Overview of nuclear accidents. Classification of radiation accidents. Analysis of dangerous events and accidents that led to the deterioration of the ecological state of the environment.

References:

1. Bilyavskiy G.O., Furdyy R.S., Kostikov I.Yu. Basics of ecology: Textbook, 2nd ed. - K.: Lybid, 2005. - P. 9-27.
2. Heinrich D., Gergt M. Ecology: dtv-Atlas: trans. from the 4th German kind. / Artist Rudolph and Rosemary Fanert; of science ed. trans. V.V. Serebryakov - K.: Znannia-Press, 2001. - P.260-266.
3. Bugayev A.F. The Code of New Civilization: Basics of Ecological Safety. - K.: "SPD Pavlenko" Publishing House, 2020. - P. 6-8.

Content of lecture

1. Radioactive, chemical and physical pollution of the air basin, surface and underground waters, destruction and pollution of the earth are characteristic features of the deterioration of the ecological state. Large-scale drainage works in Polissia led to a drop in the groundwater level and soil degradation. As a result of the disaster at the Chornobyl NPP and radioactive contamination, the use of soils and forests became more difficult, threatening conditions for the population's living conditions developed.

Donbas is a powerful national economic complex with highly developed industry, intensive multi-branch agriculture, and a wide-ranging transport system. The development of industry took place there mainly in an extensive way, without the implementation of a complex of measures for the protection of natural resources. The long-term combination of coal mining with the work of metallurgical, petrochemical and machine-building enterprises led to the fact that Donbas became the most polluted region not only in Ukraine, but also in the world. This requires significantly changing the structure of its territorial production complex, switching to low-waste resource-saving technologies to reduce waste, dispose of or eliminate their accumulations.

The second region with a developed industry is the **Dnieper region**, which is characterized by a high concentration of mining ore, black and non-ferrous metallurgy, construction industry, heavy engineering. The focus on the use of local raw materials led to the depletion of natural resources. This region is characterized by a high level of air and water pollution, mechanical disturbance of the land, and critical environmental conditions of the population's life.

2. Classification of radiation accidents and events

Level	Type	Criterion	Examples
7	Major accident (catastrophe)	The external release of most of the radioactive material from a nuclear installation or reactor is equivalent to tens of thousands of terabecquerels of ^{131}J . Such release leads to global long-term environmental disturbances, acute impact on human health in most ecosystems that cover the area of several countries	Chernobyl NPP, 1986, Ukraine
6	Serious accident	External emission of radioactive materials equivalent to thousands to tens of thousands of terabecquerels of ^{131}J . Such an emission leads to significant environmental violations, negative impact on the health of people of a certain country or region	Nuclear fuel processing plant in Kishtym, 1957, Russia
5	An accident caused by a risk outside the nuclear facility	An external release of radioactive materials equivalent to hundreds or thousands of terabecquerels of ^{131}J . Such an emission leads to local environmental	Windscale plant

		consequences and affects the health of people around the nuclear facility. Serious damage to a nuclear installation or reactor.	reactor, 1957, UK
			Three Mile Island NPP, 1979, USA
4	An accident not associated with a significant risk outside the nuclear facility	An external release of radioactivity resulting in an exposure dose for the most affected persons outside the nuclear facility of about a few millisieverts Significant damage to a nuclear facility or reactor Irradiation of one or more personnel with a high probability of premature death	Nuclear fuel reprocessing plant at Windscale, 1973, UK Saint Laurent NPP, 1980, France
3	A serious incident	External release of radioactivity, resulting in an exposure dose for the most affected persons outside the nuclear facility of about tenths of a millisievert A site event that causes significant doses to personnel or an event that causes serious contamination, but the radioactive material may be returned to an appropriate containment area Incidents where further failure of the safety system could lead to an accident	Vandelos NPP, 1989, Spain
2	Incident	An event resulting in exposure of personnel significantly exceeding the established annual limit, or an event causing the loss of significant amounts of radioactivity in areas of the nuclear facility not designated for this purpose by design Incidents accompanied by the failure of some radiation safety devices	
1	Anomaly	A non-standard situation that goes beyond the established operating mode of a nuclear facility. It is caused by equipment failure, human error, or faulty procedures	
0	Deviation	A non-standard situation that has no significance from the point of view of radiation safety	

Lecture No 17

Title: The concept of scientific research, its structure in ecology. Modern directions of ecological research.

Lecture Plan:

1. Organizational structure of science. Basic provisions of science that determine scientific and technological progress. Types and forms of scientific research.
2. Processes of scientific environmental research: topic selection, information search, scientific search (theoretical model or hypothesis, experimental verification, processing and evaluation of results, formation of conclusions), publication of results.

References:

1. Bugayev O.P., Rudko G.I., Bilyavskiy G.O., Yatsyshyn A.V. Environmental security of man in the universe: resource and energy information aspect: in 2 volumes. - Kyiv-Chernivtsi: Bukrek, 2018. - Volume 1. - P. 183-293.
2. Saienko T.V. Education of an environmentally safe information society: problems and prospects. Monograph. - K.: Education of Ukraine. - 2008. - P.10-62.
3. Skrebets V.O. Environmental psychology: education. manual - K.: MAUP, 1998. - P. 3-89.

Content of lecture

1. Scientific research is the process of studying a certain object (subject or phenomenon) with the help of scientific methods, which aims to establish the laws of its origin, development and transformation in the interests of rational use in practical activities.

There are two forms of scientific research: fundamental and applied. Fundamental scientific research is a scientific theoretical and experimental activity aimed at gaining new knowledge about the patterns of development and interconnection of nature, society, and man.

The organization of science in the state includes four main sectors:

- academic - aimed at providing fundamental research leading to new knowledge, ideas and theories;
- university - aimed at providing fundamental and applied research that provides new knowledge and developments suitable for practical application;
- sectoral - aimed at conducting applied research and implementation of developments and innovations;
- production - related to the introduction of scientific and technical developments, improvement of equipment and technologies, thanks to which inventions are made, new equipment and new products are created.

Direct scientific activity in Ukraine is carried out by:

- research and project institutions and centers of the National Academy of Sciences;
- research institutions of the system of branch academies of sciences;
- research units and departments of higher educational institutions (institutes, academies, universities);
- research, project, design, technological and other institutions of ministries and departments;
- research, design institutions and centers at industrial enterprises and associations,
- research, design, technological and other institutions and centers created on a commercial basis.

The entire set of scientific institutions and organizations forms the organizational system of science in the state. The hierarchical structure of this system is crowned by the Ministry of Education and

Science of Ukraine. It is the highest state body that solves the task of comprehensive use of the achievements of science and technology in all branches of social production.

The exclusive competence of the Ministry includes carrying out scientific and technical forecasting, ensuring the concentration of resources of academic, university and branch science on priority directions of scientific and technical progress, managing the state system of scientific and technical information, deepening scientific and technical cooperation with other countries of the world. The Ministry is the highest functional body of the state management of science, which is empowered to implement scientific policy, plan, forecast and control the scientific activity of all scientific institutions and organizations of Ukraine.

In the system of state organization of science, an important place belongs to the **Higher Attestation Commission of Ukraine (HAC of Ukraine)**. It is a state body that supervises the attestation of highly qualified scientific personnel, ensures the unity of requirements for candidates and PhD candidates, monitors the quality of dissertations, their scientific and practical value, thereby participating in the formation of the state's scientific potential.

Scientific and technical progress (STP) means a continuous interdependent process of development of science and technology; in a broader substantive meaning, it is a constant process of creating new and improving applied technologies, means of production and final products using the achievements of science.

2. It is customary to call the **object of research** what the researcher's cognitive activity is aimed at. In ecology, these are **ecosystems** and forms of their reflection, chosen in accordance with the purpose of the study. **The subject of research is a property, a characteristic of the object** of research. A characteristic feature of scientific research is the use of **scientific methods** that exclude the subjective interpretation of results and the possibility of verification of the obtained results. No claims should be taken at face value, even if they come from reputable scientists. Methods are divided into two groups: theoretical and empirical.

Ecology is the science of relationships between organisms and supraorganisms biosystems with the environment.

The objects of its study are organisms, populations, biological species, ecosystems and biosphere in its relations with the environment.

The subject of the study of ecology is the relationship between these biosystems and the environment, the patterns of development and functioning of supraorganismic biosystems. The concepts of "ecology" and "ecological situation" should not be confused.

Ecology - science, therefore, cannot be good or bad, just as, say, mathematics cannot be good or bad. Only the ecological situation can be good or bad.

Ecology as a science performs certain tasks:

- Study of interactions of organisms and their groups with the environment;
- Studying the organization and functioning of biological groups;
- Development of methods for determining the ecological state of ecosystems;
- Observation of changes in ecosystems and the biosphere and their forecasting;
- Development of the basics of rational nature management;
- Application of ecological knowledge in environmental protection.

In addition to theoretical ones, there are applied fields of ecology:

- Medical ecology
- Agroecology
- Hydroecology

- Ecology of cities
- Transport ecology
- Landscape ecology
- Space ecology, etc

Ecopsychology is a new scientific direction, formed in the aggravated ecological situation at the end of the 20th century. based on the integration of scientific knowledge related sciences: sociology, medicine, philosophy, pedagogy. It requires theoretical research, the development of a conceptual thesaurus, and the establishment of the laws of development of the human psyche under the influence of variable eco-reality.

Ecological psychology is defined as an independent direction of psychological sciences, which study the peculiarities of the mental effect on the consciousness (individual and social) of the natural, artificial and social environment, as well as the internal environment and mental states of the person himself.

This definition introduces **three key concepts: consciousness, environment, psychological influence (meaning both the one-sided influence of the environment on human consciousness and the reverse influence of a person on the environment)**. Based on this, we will consider the subject of ecopsychology not consciousness in itself (it is a subject of general psychology), but ecopsychological content in the context of human interaction with the environment (interconnection and mutual influence).

That is, the **subject of ecopsychology** is the interaction of a person with the living environment and the mutual influence that gives rise to the phenomenon of mental experiences - from emotions and moods to motives of activity, aspirations, value orientations, actions, preferences, manifestations of will.

The **object of ecopsychology** is not outside a person, but within him, in his feelings, thoughts, experiences, consciousness and subconsciousness.

The tasks of ecopsychology in the study, development and implementation of means and methods of correction and management of the development of mental phenomena of eco-consciousness, including the **goal of forming eco-tributive (eco-expedient) behavior and activities of people**. That is, ecopsychology develops and creates special informational, psychological-pedagogical, social, medical-psychological, administrative, management, intellectual technologies with an emphasis on the key word "psychologist". All the mentioned technologies are intellectual in content, and pedagogical in form and organization, principles of implementation, regardless of where they are used: in correction or examination, in training or education.

