

THE ROLE OF PHYSICS IN STUDENTS' NATURE CONSERVATION

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Abstract. *In this work we show that in order to prevent the negative consequences of human penetration and intervention in nature, it is necessary to solve a number of scientific-technical, socio-political, economic and other problems, among which the issue of environmental education and upbringing of the young generation is the most important. It has been considered that the growing young generation should be ready to take a careful approach to the natural environment that surrounds us from the threshold of school and a scientific approach.*

Key words: *physics, biology, chemistry, ecology, nature, climate, mechanics, heat, nuclear energy, environment, biosphere.*

While studying the physics course, students learn about the relationship between society and nature, the importance of the atmosphere for the existence of life on Earth, the main sources of its pollution, the impact of these pollutions on the environment and life processes, measures to protect living nature from the effects of harmful physical factors, the possible harmful effects of changes in the natural environment. must have a clear idea of the consequences (including those involving schoolchildren themselves). This can be done without expanding or overloading the program, but by focusing students' attention on environmental issues closely related to the educational material, and by organizing appropriate extracurricular activities. These are important for students' conservation work. It is important to mention here that the issue of climate change, which is becoming a global issue today, is very important. The issue of ecological education and upbringing and the issue of climate change are closely related to each other [1-4]. Protection of nature should be understood as the protection of wholeness, integrity, and not individual components - water, soil, air, flora, fauna, universe. Natural factors of the environment are understood as objects, processes and events that existed before the appearance of man and have changed little or not at all due to the influence of man. (Significant quality change resulting from natural origin is called anthropogenic factor.)

Natural factors that negatively affect nature always interact with anthropogenic

factors. In a number of regions, anthropogenic factors significantly exceed natural factors in their influence, thus determining the development character of the entire geographical crust. Anthropogenic physical and technical factors are classified according to the following characteristics:

1. By physical nature: mechanical (pressure of wheels and tracks of cars, suspensions in water and air, currents, deforestation, obstacles to the movement of fish, vibrations, overturning of soil layers, etc.); physical (light, electric and magnetic fields, sound and radio waves, transition of substances from one state to another, change of humidity, etc.).

2. According to the duration of action: exposure only when it is present (electric field, radio and light waves, noise, etc.); short-term (drip irrigation, watering, contamination of the soil with volatile substances, etc.); long-term (radioactive pollution).

3. According to the ability to accumulate in nature: non-accumulating (sound, vibration, radio waves, electric and magnetic fields, snow, etc.); short-term accumulation and, as a result, increasing their impact (for example, cleaning the atmosphere from dust); accumulator (radioactive long-lived substances).

4. According to migration ability: non-migratory (vibration, pressure, etc. at the place of origin and a short distance from it); migration with water and air currents (dust, heat, etc.) and vehicles (ships, airplanes, tractors, cars), as well as people.

5. According to the scale of the closed space: operating only at the place of production; coverage of small areas; the effect covers large areas, and sometimes (for example, in the case of radioactive long-lived substances) the entire planet.

6. By types of human activity: energy industry (heat and hydropower, water flow, wind and solar energy, nuclear energy); production industry (metallurgy, metal processing, textiles, food, etc.); transportation; communication; chemical industry; military industry.

The listed environmental factors can have different effects on living organisms; limitations that make it impossible to exist in these conditions; modifiers causing anatomical and morphological changes in organisms; signals indicating changes in other environmental factors.

It follows from the analysis of environmental factors that many of them (temperature, humidity, light, etc.) are physical quantities and concepts, which determine the importance of physical knowledge for solving environmental problems.

In fact, the formation of any biological structure and its functions depend primarily on the physical environment in which a living organism lives. For example, in order to swim quickly in water with viscosity and density, a fish must have an ordered, simplified form defined by the laws of hydrodynamics.

The physical environment and the biological world combine with each other and form a unique large system - an ecosystem, in which the substances necessary for life - soil, air and water, on the one hand, and plants and animals - on the other hand, carry out a continuous cycle. Changes in the physical parameters of the environment, of course, lead to changes in the biological world.

The role of physics in understanding the biosphere as an integrated dynamic system is determined by the following circumstances:

- ❖ soil , water, air, etc., which are included in the Earth 's biosphere, are the objects of study of physics and other natural sciences;
- ❖ many processes occurring in the biosphere, the stability of which depends on the physical properties of these objects , as well as the physical properties of other elements of the biosphere ;
- ❖ physical processes (heat , electromagnetic, radioactive, etc.) take place in the biosphere, closely related to biological and other processes.

The complex and integral nature of environmental problems does not allow them to be fully disclosed to high school students. Nevertheless, the content of the program material of the physics course allows schoolchildren to get acquainted with a number of ideas that reveal the physical and technical side of the current environmental crisis and ways to overcome it. This is related to :

- Physical science studies the most general and fundamental laws of nature, which are the basis of the correct perception of the whole nature as a whole. This allows to reveal to the students in a consistent sequence the diversity, interdependence and integrity of phenomena and processes occurring in nature in the course of teaching physics;

is the core of the modern scientific and technical revolution;

his achievements are the foundation of modern technologies. It allows students to show the ever-increasing scope of human influence on nature, a number of social consequences of this influence in today's scientific development , and the solution of modern problems of protecting the environment from pollution;

- physics is leading among natural sciences today ; they all use his terminology,

tools and research methods. Therefore, in the teaching of physics, there is an opportunity to introduce students to modern methods of studying nature and its protection, to generalize the knowledge gained in the lessons of other sciences of the natural-mathematical cycle. One of the most important tasks of the school physics course is to form a scientific approach to natural phenomena and processes in students, and to form their skills and abilities to conduct scientific experiments. This allows schoolchildren to develop skills that are important for learning and solving physical and environmental problems.

students should be familiar with in the study of physics, we put a systematic approach to understanding the biosphere and the place of man in it. At the same time, the following are taken into account:

- 1) the environment should be logically related to the content of the physics course; their use is aimed at clarifying and deepening physical knowledge;
- 2) that the ecological materials aimed at consideration meet the principle of scientificity, to develop dialectical-materialistic views of nature in students, to understand the consequences of the process of human influence on the environment ;
- 3) the studied questions should be easy to learn, take into account the age- related thinking characteristics of students, their experience, activate their mental activity , contribute to the development of associative thinking .

At the same time In order to form knowledge about the biosphere as a whole system, students should learn the following it is possible to distinguish basic, basic ecological concepts :

- 1) land, water, atmosphere biosphere as single elements of the system, their basic physical properties;
- 2) physical factors of the natural environment and their parameters;
- 3) the role of physical factors and parameters in the course of physical, chemical, biological processes in the biosphere;
- 4) permissible norms of physical parameters for various biosphere phenomena, objects and processes;
- 5) physical pollution of the natural environment (that is , deviation of the physical parameters of the environment).

The main physical factors of the biosphere and their parameters are physical concepts and quantities that reflect the main individual and general physical properties of solid, liquid and gaseous substances and the physical processes of exchange

between them (at the smallest particles, atomic and molecular level) at this stage of the development of science.

The physical parameters of the fields entering the biosphere are as follows: gravity field - acceleration of free fall; electric field - voltage, potential; magnetic field — magnetic induction; electromagnetic waves - wavelength, density of electromagnetic radiation current.

Students will become familiar with many of these concepts and quantities as they study physics. However, the following should be taken into account when giving them an ecological interpretation. Firstly, the level of impact of some parameters on the biosphere has not yet been fully determined by science or is only being studied; secondly, the influence of a number of physical factors on living nature is determined only for narrow ranges of relevant parameters. In this regard, the famous American physicist V.F. Weiskopf stated that "we are faced with a complex tangle of physical, chemical, biological cause and effect, many of which are only partially understood. Much serious fundamental research must be done before these problems can be effectively solved" [5].

During the scientific and technological revolution, the development of energy, transport, and industry has led to severe pollution of the biosphere and large deviations from the norm of its basic parameters, which inevitably leads to the destruction of the self-stabilization and self-cleaning ability of both its individual biological systems and the entire biosphere. . Since it was physics that discovered the laws of nature that technology uses to produce material goods, it is important to explain this connection between physics and technology from an ecological perspective.

In such cases, we should focus on the following points: what is processed (materials), what is processed (energy), how is processed (technology). The development of technology and its connection with physics can be schematically shown in Table 1, the stages of human knowledge and mastery of the surrounding world, the extent of its impact on nature.

Thus, the following ecologically important problems can be revealed in a physics course:

- 1) rational use of energy resources: oil, gas, coal , peat , etc.;
- the most environmentally friendly, convenient and environmentally friendly methods of using mechanical, internal ("heat"), electric and nuclear energy;
- 2) rational use of raw resources : water, land, minerals, etc.

related to each other , as they have a common scientific basis - optimization of interaction between society and nature in the conditions of rapid development of technology and modern production . These are directly related issues:

- 1) physical methods of protecting the natural environment from pollution;
- 2) use of renewable energy sources (solar radiation , Earth's internal energy, wind energy, sea waves).

When considering ecological issues, students should have an understanding that the problem of nature protection cannot be solved only on the basis of natural science and technical achievements, changes in production technology, extraction of raw materials and methods of processing them in certain areas.

Table 1 . Development of science and technology and its connection with physics.

Levels of knowledge	I production materials	Types of energy in material processing	Organizational forms of production
Astronomy, the emergence of mechanics	Copper, iron, life	humans and animals	craft production i
Formation of classical mechanics and theoretical optics	Iron, coal, carbon steel	Mechanical, hydraulic and wind	Bench craft production
Development of classical physics, thermodynamics and electrodynamics	Carbon steel , alloy steel, coal, peat	The beginning of the use of "heat" energy	Manufacturing production
Formation of electronic theory and atomic physics	Alloy steel , special alloys, coal, peat, oil, gas	Internal ("heat"), electric	machine production
The development of all areas of science, the emergence of nuclear physics	Alloy steel , special alloys, aluminum, coal, oil, gas, synthetic materials	Internal , hydraulic, electric, nuclear	Automatic and serial mass production
The development of quantum physics, the cosmosappropriation	The emergence of the possibility of obtaining materials with any characteristics	All kinds of energy	Advanced forms of automatic production

Protection of the environment that surrounds us requires large material costs, the involvement of additional labor resources, legislative and political measures, and the

unification of forces in the scientific field. Comprehensive assistance in the development of universal environmental goals and their achievement is one of the urgent tasks of today, and at the same time, it is a wide area of joint activity for countries with different social systems - an activity that strengthens communication and cooperation between them, only this alone can protect our Earth from the effects of the ecological crisis. can protect.

In the process of teaching physical science, the formation of a responsible attitude to the natural environment in students is not limited to mastering the system of ecological knowledge, it is also related to the formation of skills and competences of a nature protection nature. Based on the current content of the concept of "nature protection" and the structure of environmental knowledge in school education, we can distinguish the following nature protection skills that should be formed and developed in students during the teaching of physical science:

- ❖ measurement of a number of basic physical parameters of the natural environment (temperature , air humidity, light, etc.);
- ❖ assessment of the main physical factors and parameters for various objects , events and processes occurring in the biosphere , and their permissible norms ;
- ❖ choosing a method of rational use of natural resources and different types of energy (mechanical, electrical, etc.) in practical activities;
- ❖ to foresee the possible consequences of one's activity for the physical state of the environment and to critically assess the actions of individuals when interacting with it ;
- ❖ assessment of the physical condition of the natural environment formed under the influence of anthropogenic factors ;
- ❖ use of physical ideas and laws based on the use of renewable energy sources , methods of combating various pollutions and optimizing society's interaction with naturepromotion and support

CONCLUSION

Ecological information is an integral and important component of the fundamentals of physics and other natural sciences studied in a modern secondary general education school , on the basis of which the ecological culture of the growing young generation is formed, in particular, the physical, technical and technological aspects of maintaining the balance in nature, preventing its disturbance. In the conditions of scientific and technical progress, it serves as a guarantee for the correct

choice of the direction of development of production activities of human society, that is, it serves as an important direction of preparing young people for life and work. This training will be more effective if the students at school have practical skills to learn about nature, rational use of natural resources and methods of environmental protection. The physical aspects of ecological knowledge leads to the deepening and expansion of students' knowledge of physics, increasing their interest in science, forming a number of nature protection skills in them, convincing them that ecological knowledge and skills are vital, and instilling in their minds the integrity of nature. forms a scientific imagination, the place and role of a person in it, helps to understand the current and prospective tasks that humanity must solve in the protection and rational use of natural resources, their increase.

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