Interaction between Ecology and Economics: Total Unity or Antithetical Dissociation

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Abstract: This topic is more relevant than ever, because the ecological system is in a state of crisis. It is closely intertwined with the economic one at the local, regional, national and global levels, and due to the aggravation of socio-economic and political problems, it requests a change in the direction of development of modern civilization. In this paper, the issues of interaction between economics and ecology are considered in detail. The article explores the contemporary ecological situation and economic growth as the cause of crisis and ways to solve environmental problems from an economic point of view. The article reviews and analyzes existing literature on the economic impact of environmental crises, as well as potential solutions to reduce the ecological impact of economic growth. The article finds that the existing economic system exacerbates environmental problems, including desertification, depletion of natural resources, destruction of the ozone layer, acid rain, and others. The primary contradiction between economic and ecological development lies in the fact that economic growth creates harmful environmental consequences. The article emphasizes the need for coordinated action by governments to address environmental problems and find sustainable solutions for effective production, transport, and renewable energy use, as well as waste processing technologies that do not pollute the atmosphere. The article highlights the importance of addressing the ecological crisis and finding a sustainable path forward, which requires coordinated global action to address the economic impact on the environment.

1 INTRODUCTION

Ecology is the natural science of the interactions between organisms and the environment. And ecological research has traditionally been based on the interpretation of the non-human world and has hardly touched upon human society. In this article, ecology will be seen as the biosphere, i.e. the natural environment, and economics will refer to the production, exchange, consumption of goods and services. If we look at the origins of these two concepts, we can see that they share a common root, "oikos", which literally means "home, abode" in Greek.

The concept of economic development refers to economic growth. It is inconceivable without scientific and technological progress, and without securing and maintaining a constant rate of production growth, which implies an increasing dependence on natural resources. Society has always depended on natural resources, but the problem is that this dependence is not taken into account in economics. Man tends to consume rather than conserve. It turns out that the main contradiction between economic and environmental development is that, on the one hand, the economy has to develop, and on the other hand, this development generates detrimental effects on the environment. This article will look at the scale of these impacts in today's realities.

The interaction of ecology and economy is one of the most important problems of our time. On the one hand, economic growth and development require a certain level of use of natural resources, which leads to an increase in the negative impact on the environment. On the other hand, given the growing environmental awareness of society and the need to preserve natural resources, it is important to find a balance between economic interests and

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environmental protection. This article will consider the problem of interaction between ecology and the economy, explore the possibilities and limitations of the integration of economic and environmental goals, and analyze trends and challenges in this area.

2 THE RELATIONSHIP BETWEEN ECOLOGY AND ECONOMICS

The economy and the environment are linked. They have a significant impact on each other. The relationship between society and nature is a case in point. In the first stage, their commonwealth in environmental protection measures as follows: the increasing consumption of natural resources leads systematically to the depletion of natural resources and the increasing input of waste from human production/living activities into the environment. Virtually everything involved in production eventually returns to the environment in the form of waste. This, in turn, leads to higher costs for natural resource extraction and environmental remediation.

An example of the relationship between economic processes and the environment is the construction of wastewater treatment plants. Most industries disturb the environment, or rather its purity, so they build wastewater treatment plants to avoid polluting the water, the air, etc. These facilities are expensive, and manufacturing companies try to save money by doing harm and pollution.

Due to the increase in gross product, production capacity, the environment is deteriorating. For comparison, production today has increased 20-fold compared to mid-twentieth century figures. Chemical/petrochemical/pulp and paper production, motor transport and mineral extraction companies cause the greatest negative impact on the environment.

Table 1: GDP dynamics for 1950.

Regions, groups of countries, countries	GDP, billion dollars in 1993 prices			Population, million people			Specific gravity, in %			
	1950	1996	difference factor	1950	1996	difference factor	in world GDP		in the world population	
							1950	1996	1950	1996
World, including:	5621	32925	5.9	2510	5771	2.3	100.0	100.0	100.0	100.0
North America	1984	8255	4.2	218	457	2.1	35.3	25.1	8.7	7.9
South America	295	1963	6.7	112	326	2.9	5.2	6.0	4.5	5.6
Europe	2081	8803	4.2	569	793	1.4	37.0	26.7	22.7	13.8
Africa	239	1460	6.1	223	736	3.3	4.3	4.4	8.9	12.7
Asia	941	12015	12.8	1376	3431	2.5	16.7	36.5	54.8	59.4
Australia and Oceania	82	430	5.2	13	29	2.3	1.5	1.3	0.5	0.5
Former socialist countries, including:	857	5236	6.1	875	1757	2.0	15.3	15.9	34.9	30.5
the same without China	707	1869	2.6	331	543	1.6	12.6	5.7	13.2	9.4
China	150	3366	22.4	544	1214	2.2	2.7	10.2	21.7	21.0
USSR	410	897	2.2	180	293	1.6	7.3	2.7	7.2	5.1
Russia	249	585	2.4	102	148	1.4	4.4	1.8	4.1	2.6
Market economies, including:	4764	27690	5.8	1635	4014	2.5	84.7	84.1	65.1	69.6
developed, including:	3644	17347	4.9	546	814	1.5	63.0	52.7	21.8	14.1
USA	1754	6786	3.9	152	266	1.7	31.2	20.6	6.1	4.6
developing, including:	1220	10343	8.5	1089	3200	2.9	21.7	31.4	43.4	55.5
Latin America	396	2794	7.1	159	476	3.0	7.1	8.5	6.3	8.3
countries south of the Sahara	130	607	4.7	164	558	3.4	2.3	1.8	6.5	9.7
energy exporters	127	1234	9.7	79	301	3.8	2.3	3.7	3.2	5.2

Table 2: Evolution of the countries with the highest GDP for 2020-2022, trillion dollars.

№	Country	2020	2021	2022
1.	United States of America	20 893.75	22 997.50	25 346.81
2.	China	14 862.56	17 458.04	19 911.59
3.	Japan	5 040.11	4 937.42	4 912.15
4.	Germany	3 843.34	4 225.92	4 256.54
5.	India	2 667.69	3 177.92	3 534.74
6.	United Kingdom	2 758.87	3 187.63	3 376.00
7.	France	2 621.96	2 935.49	2 936.70
8.	Canada	1 645.42	1 990.76	2 221.22
9.	Italy	1 891.06	2 101.28	2 058.33
10.	Brazil	1 448.55	1 608.08	1 833.27
11.	Russia	1 483.38	1 775.55	1 829.05
12.	Korea	1 638.26	1 798.54	1 804.68
13.	Australia	1 357.32	1 633.29	1 748.33
14.	Iran	938.05	1 426.30	1 739.01
15.	Spain	1 280.46	1 426.22	1 435.56
16.	Mexico	1 087.12	1 294.83	1 322.74
17.	Indonesia	1 059.90	1 186.07	1 289.30
18.	Saudi Arabia	703.37	833.54	1 040.17

It is important to note that an increase in the gross product does not simply lead to the pollution of natural resources, but to their complete depletion. This is due to the fact that most businesses use them irrevocably. Recently, there have been more and more people on the planet, which means that:

- the number of industries is increasing;
- consumption of water, land, biological and mineral resources is increasing;
- more and more waste.

All of the above factors are contributing to an unfavourable environmental situation around the world.

The underlying challenge is to ensure that economic performance advances, but in a way, that does not cause even minimal damage to the global environment. Such a happy outcome, say participants at international conferences, is only possible with a global modernization of production activities.

If there is economic growth and environmental improvement, the researchers estimate that there are two outcomes - favorable and unfavourable. Opponents of economic growth are strongly concerned about the environment. They believe that it, along with industrialization, should be deliberately curbed. This position is close to the "zero-growth theory", according to which the only solution is to stop or stabilize economic growth at an optimal level that does not threaten the natural environment.

Other proponents in defence of economic growth say that the link to the state of the environment is greatly exaggerated. They argue that if one were to abandon economic growth and maintain GDP at the

same level, one would still have to choose between different patterns of production.

The concept of sustainable development is based on the idea of sustainable use of the resource base. From an ecological point of view, this principle is fundamental in dealing with environmental issues. The main idea of the concept is the unity and interrelation of economic, social and environmental development. The integration of economic and environmental interests can be achieved by increasing the efficiency of benefit extraction with constant resources. Sustainable development implies meeting the needs of the present without harming future generations. In order to achieve this, environmental legislation must be improved, the gap in living standards between peoples must be narrowed and an environmental mindset must be fostered.

Economic development can aggravate the negative impact on the environment, because it is accompanied by trends of increased consumption, trade and production. All this leads to intensive pollution of the environment and big environmental problems.

It has to be admitted that there can be a positive impact. This condition will be fulfilled if the economic growth is expressed in a higher standard of living, a stable state budget, and a deferred tax system. These factors will increase investment in the environment, the use of quality waste management technology, and the cleaning up of rivers, forests and water bodies.

There are already special nature conservation organizations in certain countries, which are responsible for ensuring that nature thrives and is preserved. These international public environmental organizations include:

The World Wildlife Fund - WWF. It is an independent foundation for the protection of rare and endangered wild animals.

Greenpeace. Greenpeace campaigns for solutions to global environmental problems by bringing them to the attention of the authorities and the public.

Helcom. Helcom (Helsinki Commission): works for the protection of the aquatic environment in the Baltic Sea Region.

The types of international environmental organizations are manifold and can be categorized in many ways. Among the intergovernmental organizations, UN specialized agencies such as:

- UNESCO;
- FAO;
- WHO;
- WMO;
- IMCO;
- IAEA.

Although they have been set up to fulfil other purposes and tasks, the protection of the environment is part of their remit. The International Union for Conservation of Nature and Natural Resources (IUCN), established by a decision of the founding assembly in Fontainebleau in October 1948, tops the list of international non-governmental organizations in the field of environmental protection.

Different countries have their own idea of "cleanliness" and thus of how to combat pollution. Much depends on the location and size of the country, the scale of industrial production and other factors. As a rule, the most favorable situation is observed in the richest countries in Europe and some other countries with a high standard of living, including Australia, New Zealand and Canada. Based on current data from the Environmental Performance Index, developed by scientists at Yale and Columbia University in the US, Table 3 shows the cleanest countries in the world for 2022.

Table 3: Green countries by 2022.

№	Country
1.	Denmark
2.	Luxembourg
3.	Switzerland
4.	United Kingdom
5.	France
6.	Austria
7.	Finland
8.	Sweden
9.	Norway
10.	Germany

3 THE NEED TO CARE FOR THE ENVIRONMENT

Environmental problems directly affect the economy. Therefore, special attention should be paid to them, as they can undermine the development and security of a country and of humanity as a whole. Environmental problems include:

- land crisis;
- water pollution, water bodies;
- demographic problem;

- air pollution;
- shrinking energy supplies;
- deforestation;
- natural disasters;
- loss of flora and fauna;
- major epidemics, serious diseases.

When forests are clear-cut for economic purposes, the state of the ecological system is not taken into account. The permanent destruction of forests has a huge impact on the **ecosystem** as a whole. Destruction of forests leads to a loss of biodiversity (some plant and tree species are already extinct and others are in danger of extinction). Due to the loss of biodiversity of animals and plants, there is a decrease in products such as medicines which are so important for humans.

Industries emit large amounts of carbon dioxide, methane and other heavy compounds into the atmosphere. These substances concentrate and form a veil in the sky that lets in sunlight but traps heat. It contributes to the greenhouse effect and this changes the climate. The changes are manifested in rising ocean levels, thawing permafrost, shifting frosts and thaws, abnormally hot weather, and cataclysms. If no action is taken to reduce emissions, air temperatures will rise by 4.5°C by 2100.

The amount of phosphates, nitrates, carcinogens and other substances is changing the composition of the water. According to the UN, 30 billion tonnes of oil products, 50,000 tonnes of pesticides, 5,000 tonnes of mercury enter the world's oceans every year. It should be known that industry uses millions of cubic metres of water resources. Water is also important for agriculture. For example, the smelting of 1 tonne of steel requires 200 m^3 of water and the production of 1 tonne of synthetic fibre requires between 2,500 and 5,000 m^3. Currently, the world's freshwater resources are only 2.5%, 2/3 of which is from glaciers. At this rate, in 80-100 years' time, there will be no freshwater left at all.

Air and water pollution are occurring at the same time as soil contamination. Industrial emissions are changing the structure of the soil. Chemical fertilizers (aluminium, zinc, lead) kill the humus, disrupt the natural cycle of components of the biosphere. Of the approximately 140 million square metres of land (as of 2022), 23% is degraded and 15% has been completely lost.

Changes in environmental indicators affect the economy in the following ways:

1. The reduction in land resources has an impact on food production.

2. Reduced forest areas are followed by a decline in food, energy resources and other forest products, which affects the economies of most countries in the world. Annually, losses of up to $5 trillion are reported for the destruction of forested areas.

3. Reducing air pollution requires large financial outlays. It requires developing and implementing high-tech processes and moving people towards low-emission products and services.

4. Unless measures are taken to protect, manage and treat water, water scarcity for the population will increase from 40% to 65%. This problem is difficult to solve due to poor economic viability and high costs.

5. In order for the 828,000 people (as of 2022) to avoid hunger, it is necessary to increase production of goods and energy by a factor of 5-10!

We need to pay attention to the environmental friendliness of production. This is important because investing in ecology is an investment in the development of industry and the economy of a country. A good example is the United States, where the Clean Air Act was passed in 1970 and the Environmental Protection Agency was created. During this programme and the introduction of the sulphur dioxide emissions trading system in 1990:

1. Air quality in the country has improved.
2. Number of harmful impurities in the air has been reduced.
3. Standard of living has improved.
4. Country started to attract emigrants.
5. Mortality rates went down.
6. Number of highly skilled people increased.
7. Improved investment attractiveness.
8. Companies involved in the project have received additional money.

It is now necessary not only to remove the effects of pollution, but also to set a goal - to develop a concept that does not involve so much damage to the environment and does not inhibit economic development. In 1987, the UN adopted the concept of sustainable human development, according to which the needs of the present generation can only be met without harming future generations. It suggests that it is necessary to limit not only the pollution affecting the population today, but also the long-term risks for the environment in the future.

Part of the concept of sustainable development is a cluster of green technologies, which minimize human impact on the environment and make it possible to do business responsibly. Clean technology is the world's third-largest investment after IT and biomedical technology. This is one of the most promising sectors for venture capital investment. China, Europe and the US are leading it. Great hopes are pinned on technological breakthroughs: industrial giants are allocating multi-billion dollar budgets

(Figure 1, 2) to develop innovative solutions and buying start-up developments.

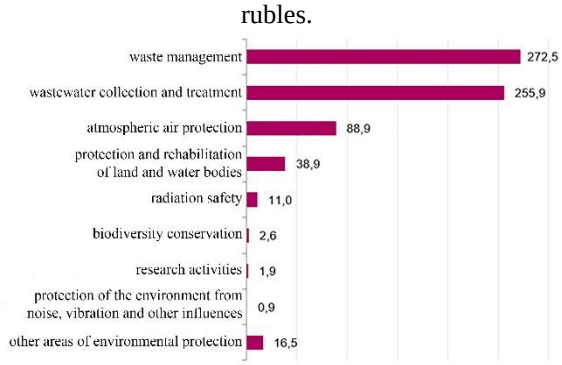

Figure 1: Current spending on environmental protection in Russia (including payments for services and overhaul) in 2021 by area, billion.

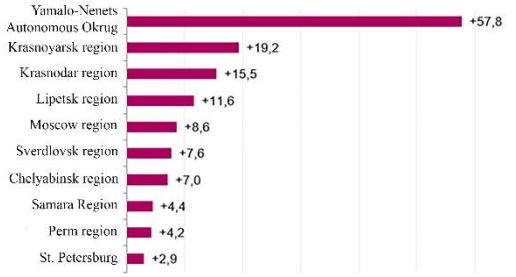

Figure 2: Regions with maximal increase in environmental expenditures in 2021, billion rubles.

Many countries around the world are actively practicing reuse of waste and recycled materials, which saves substantial funds and saves natural resources. In the long term, it is necessary to think about creating low-waste and zero-waste enterprises and technologies.

Reducing water consumption per unit of output for more efficient water management becomes paramount in the problem of water management. The issue of deforestation requires stricter penalties for illegal logging, reforestation and the gradual closure of the gap between harvested and reforested forests, better wood and waste management.

In addition to direct benefits in the form of improved environmental quality, the transformation of a green economy can further increase GDP, create new jobs, shape new industries and services, reduce resource consumption and expand the consumption of by-products, and provide healthier and more equitable living conditions for people.

4 CONCLUSIONS

The world's current economic system is an aggravation of environmental problems of various levels, scales and nature. It must be recognized that the environmental situation on the planet as a whole continues to deteriorate.

The technologisation of the global economy and unrestrained economic growth has led to global problems, such as desertification, depletion of natural resources, ozone depletion, acid rain, etc. The consequences of urbanized economic growth for the natural environment are multifaceted; above all, more intensive use of natural resources places us in danger of exhausting them altogether. At the same time, as the exploitation of natural resources grows, the amount of waste introduced into nature increases.

The main contradiction between economic and ecological development is that, on the one hand, the economy must develop, and on the other hand, this development generates consequences detrimental to the environment.

The paper considered the current environmental situation, economic growth as the cause of the crisis, and ways to solve environmental problems from the perspective of economics. I would like to point out that it focuses on the economic aspects of the environmental problem and the possibility of solving it, leaving out of it all the possible social, political and other consequences, which open the field for other studies.

Economic problems are common to all countries of the world, irrespective of their standard of living and development. Thus, coordinated action by the governments of different countries is needed to improve the situation. Governments need to work together to find options for efficient production, transport and renewable energy, as well as waste-processing technologies that do not pollute the atmosphere.

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