



§1.2 THE UKRAINIAN EXPERIENCE IN FORMING AN ECONOMIC MECHANISM FOR RESOURCE CONSERVATION AND ENERGY-EFFICIENT ENVIRONMENTAL MANAGEMENT (**Medynska N.**, National University of Life and Environmental Sciences of Ukraine, **Hunko L.**, National University of Life and Environmental Sciences of Ukraine, **Hetmanchyk I.**, National University of Life and Environmental Sciences of Ukraine, **Polishchuk S.**, Bila Tserkva National Agrarian University, **Zamlynskyi S.**, National University of Life and Environmental Sciences of Ukraine)

The system of sustainable (balanced) land use is determined by the ideology, general terms, and methodology of sustainable development. The difference between traditional and sustainable land use lies in the changing relationship between nature and humans when the environment is recognized as having higher value. The fundamental difference between sustainable (balanced) land use and traditional land use is that its economic land interests are determined not only by the operational value of land, and other natural resources but also by the need to meet environmental needs, including the need for a quality environment. Meeting these needs is associated with preserving the natural conditions of human existence based on targeted changes in economic needs.

The problem of limited land and other natural resources, and, above all, land resources, and their value characteristics are directly related to production activities, their target orientation, and motivation. It is the economic interest aimed at the current consumption of tangible and intangible goods and services, as well as their accumulation without taking into account the condition and limitations of the most important and irreplaceable land resources for human life, that has led to the occurrence of environmental needs [1]. Changing the quality and direction of economic growth toward meeting environmental needs is the main prerequisite for solving environmental problems and establishing the foundations of sustainable land use.





The transition to sustainable land use involves the formation of new reproductive relations aimed at meeting the environmental and resource needs of society. As a result, there is an essential need to build a corresponding subsystem of the national economy - sustainable (balanced) land use.

The practice of solving environmental problems of land use shows that the environment is not the entire field of land and nature use, but only that part of it in which the preservation of environmental quality and sustainable production of ecosystems, as well as the saving of non-renewable resources, are ensured.

Sustainable land use should be seen as the reproduction and rational use of land and other natural resources. In the scientific sense, the reproduction of land and other natural goods is a three-pronged process that includes the restoration (protection) of ecological systems, the exploitation of land and other natural resources, and the processing of natural raw materials. The last two stages are united by one concept - "use of land and other natural resources". The process of saving natural raw materials and utilizing waste in the field of social production is tantamount to preserving the ecological and resource potential. Thus, the boundaries of the environment itself are expanding, transforming the process of using land and other natural resources into their reproduction. Hence, the concept of "sustainable land use" includes the concept of "reproduction of land and other natural resources" (fig. 1).

Sustainable land use	
An environmental sector (in the narrow sense of the word)	The environmental sector of the real economy
Accounting, restoration and improvement of biogeocenosis productivity. Protection of the water basin. Protection of reserves, sanctuaries, etc.	Study and assessment of the potential of land and other natural resources, extraction, and processing of natural raw materials. Waste management
Reproduction of land and other natural assets	

Fig. 1. Logical scheme of the sustainable land use system





In the event of a violation of ecological balance, the period of reproduction of land and other natural goods covers centuries and millennia, going beyond economic feasibility. From the point of view of natural science, the biosphere and the ecological sphere are identical concepts. However, with the increasing interdependence of social production and the environment, with the development of a green economy, the environmental sector will be considered an economic category in scientific terms.

The purpose of ecologically oriented land use is the formation and development of ecological and economic systems of various types and scales. By ecological and economic system, we mean the integration of economy and nature, which is an interconnected and interdependent functioning of social production and natural processes in nature. The most important feature of an ecological and economic system is its regional and territorial spatiality. In the one case, the spatial boundaries of such a system may be determined by the territory of the territorial-economic system (although the consequences of interaction may go beyond it). In the other case, by the size of natural and ecological systems. From the standpoint of value relations of sustainable nature management, the ecological imperative plays a leading role in the processes of transformation of economic systems into ecological and economic ones. The ecological imperative acts as a mandatory methodological technique in solving theoretical and applied problems of sustainable land use. In the context of sustainable land use, the environmental imperative is a policy of preference (or equality) of environmental goals to other goals of the socioeconomic development of society. The ecological imperative as a necessary line of behavior of society (human) is realized through the principles of sustainable development outlined in the Rio Declaration [2] and called the Rio imperatives. These principles include: the focus of sustainable development should be on the





human being who has the right to a healthy and productive life in harmony with nature; the right to development should be exercised in such a way as to ensure equality of opportunities for development and environmental protection for both present and future generations; to achieve the goals of sustainable development, environmental protection should become an integral part of the overall socioeconomic process and cannot be considered in isolation from it; socioeconomic development should be aimed at improving the quality of life of people within the permissible limits of the economic capacity of ecosystems; unlike the current practice of nature protection, the emphasis should be shifted to the implementation of measures of greening economic activity, primarily to eliminate the causes of negative anthropogenic impacts, rather than their consequences; an important condition for society's transition to sustainable development is the eradication of poverty and the prevention of greater differences in people's living standards; the ecologization of human consciousness and outlook, the reorientation of the education and training system to the principles of sustainable development should help to prioritize intellectual and spiritual values over material ones.

These principles express the socio-natural essence of the environmental imperative, the inseparable and organic interconnection of social, environmental and economic goals of sustainable development of society and, accordingly, sustainable land use in particular.

Two types of laws can be distinguished in the system of sustainable land use. *The first one* is a general pattern that expresses the most essential and stable links of the exchange process between society and nature, and the second one is specific patterns limited by the socioeconomic framework of production relations of a particular period of development. The general pattern of sustainable land use expresses the material and





social aspects of the reproduction of land and other natural assets. The content of the material side is determined by the law of conservation and transformation of energy, which is characterized as the basic law of movement. Movement is the most general and native expression of sustainability in nature. This property is manifested in the constant self-reproduction and self-renewal of nature. The function of self-reproduction and self-renewal is performed by the living matter of the planet, which plays a major role among the components of the biosphere. No matter how productive a person is (thanks to the development of science and technology), he or she always remains a part of the living matter of the surrounding nature, an integral component of the biosphere. In any case, the interaction between our society and nature is determined by the state of living matter. The constant production of living matter in the biosphere is a necessary condition for the exchange process between society and nature. Thus, the ecological (material) side of the general pattern of land use is the constant production of living matter in the required quantity and proportions both in individual natural systems and in the biosphere as a whole. This condition can be met on the current scale of the global industry only with the appropriate greening of public production, the introduction of environmental protection equipment and technology; in other words, with the steady development of resource-saving environmental labor. In this way, the natural processes that determine the natural component of land use dictate their own conditions for its development, and ignoring them can lead to irreversible consequences. We are talking about the dependence of development on the ecological state of land use and, accordingly, the problem of land use elements regulation.

The "land use" ecosystem is, on the one hand, a living space, and on the other hand, the material and energy foundation for the development of social production. The state of land use





characterizes the way of life of a society. The quality of land use is a kind of indicator of interaction with the nature of various social systems of civilization. The effectiveness of society's impact on the land use ecosystem is the most important characteristic of socioeconomic development. The content of a particular social system determines its interests. Interests are nothing more than the driving forces that motivate people to act. Another category that is related to interests is need. The need for environmental resources is a historical phenomenon, not a natural one. While the exploitation of land and other natural resources began with the inception of society, the need for their protection and restoration arose in the course of product development, its increasing impact on nature, and in the process of human spiritual and moral development. Since the same object of land use (forest or aquatic ecosystem) can satisfy the whole range of environmental and resource needs, and also because of their social nature, the social side of reproduction of land and other natural goods should be determinant in the interaction between society and nature. The essence of the general pattern of sustainable land use is determined by the constant satisfaction of environmental, resource, and material needs based on environmentally oriented structuring of the economy and preservation of ecological balance. As human society develops, its ecological and resource needs change, but one thing remains unchanged: the function of the "society-land use-nature" super-system in all phases of land use is performed by wildlife.

The general principles of sustainable land use are a tool for implementing a general pattern in environmental and land policy, including land management methods [3]. The general pattern of land use defines four main principles.

The principle of the nature of primacy. Land use, nature, and society develop under the influence of the same objective laws of the surrounding world. However, they also have a





significant specificity of development, which in one case is expressed by the laws of nature, and in the other - by the laws of society. At the same time, society must always take into account the natural basis of its development - nature. Outside of nature, human life and labor activity are unthinkable. A human being is both a social being and a part of nature, so he or she is a biosocial being. The "society-land-use-nature" super-system is also a biosocial entity, which in its development is simultaneously subject to the laws of society and the laws of nature. However, the following should be noted here. In the "society-land use-nature" super-system, its constituent elements act as systems that collide but are not part of each other. The main content of the integral system is interaction. Its existence and development are based on the unity of the three subsystems. No unity means no system. The unity of society, land use, and nature are conditioned by the laws of nature. In order not to break the connection with land use and nature, society must take this unity into account and build its attitude toward it based on objective laws of nature's development. In other words, the most important principle of interaction between our society and nature is the principle of the primacy of nature, which requires society's influence on land use and nature to be based on its laws. Violation of this principle leads to undermining the natural basis for the development of society, and therefore society itself. In an integral system, therefore, the laws of nature play the role of a connecting, cementing link.

The principle of normative land use. In a broad sense, this principle implies the normativity of socioeconomic development in general. Fulfillment of this requirement depends primarily on the individual, and his or her level of culture, and environmental awareness. The sense of responsibility and the development of appropriate behavioral norms determine the possibility of transition to environmentally oriented development. In the





applied aspect, the system of regulatory land use is designed to ensure its sustainability and should include both ***natural and cost standards***. An example of the former is the maximum permissible limits of impact on land use and the environment, which do not exceed the assimilation potential of the territory and the size of which should ensure the efficiency of land use. However, the main land use standard is an environmentally oriented line of human behavior, driven by self-awareness and related to the problem of limited land and other natural resources and living space. Human environmental ethics is the basic norm of land use.

The principle of socialization of land use. Socialization (from Latin *socialis* – social) of land use means its transformation into the common good. In the human aspect, this principle speaks to the need for broad and comprehensive harmonization of relations between society and land use. The system of land use itself determines the humanization of society's relations to its resources. The process of socialization of land use means that land and other natural resources can only be used for the benefit of society and the entire nation while adhering to the necessary rules and regulations. ***Socialization, which is an important condition for achieving sustainable land use, has a twofold nature.*** On the one hand, the effect provided by land use is not the result of someone's activity and, from the point of view of social justice, cannot be the object of absolute private ownership. On the other hand, some land benefits are social in nature and simultaneously satisfy the needs of many people. This circumstance implies reimbursement to land users of additional costs for the reproduction of land and other natural resources at the expense of the entire society. Implementation of the principle of socialization in practice requires building an appropriate economic and legal framework that ensures a balance between individual and collective (public) land interests.

The principle of making land use more sustainable. Making land use more sustainable means the sustainable





reproduction of land and other natural resources by improving technology, organizing land use and protection, and increasing the efficiency of land use in the environmental sector. The main areas of land use greening include the preservation and restoration of ecological systems; introduction of advanced technologies for organizing the use and protection of land and other natural resources; rational use of land and other natural resources; creation and use of low-waste and zero-waste production; expansion of reserves, sanctuaries, and other protected areas; environmentally acceptable location and territorial organization of production; the reduction and elimination of land pollution.

In developed countries, the principle of greening land use is interpreted as the principle of "zero level" of the use of land and other natural resources [1].

The patterns and principles of land use of a particular social system are called individual. In the system of sustainable land use, two most important individual laws can be distinguished: maximization of the social (total) utility of land and other natural resources, and sustainable reproduction of land and other natural resources. Since the general principles are present in each of the individual laws, they reflect not only economic but also environmental interests of land use.

The social utility of land use should be considered from the point of view of the efficiency of the reproduction of land and natural benefits in meeting social needs. The content of the social usefulness of land and other natural resources, which is expressed in the maximum possible degree of satisfaction of environmental and resource needs of society with the maximum possible environmental and economic efficiency of land use, can be represented in the form of the following formula:

$$\text{SULU} = \text{AELU} / \text{NELU}, (1)$$

where SULU is the social utility of land use, fractions of a unit;





AELU - actual efficiency of land use at the current level of meeting environmental and resource needs;

NELU - normative efficiency of land use at the maximum (optimal) level of meeting environmental and resource needs, which is determined in the process of land management.

Related to the category of "*social usefulness of land use*" is the concept of "*effective land use*" (ELU), which expresses the content of rational and sustainable land use and is determined by the ratio (rule) of the mandatory prevalence of the normative (maximum possible) amount of consumption of land and other natural resources (LUN) and the actual amount of its consumption (LUA):

$$ELU = LUN / LUA. \quad (2)$$

The logic of building this formula is based on the environmental imperative and takes into account the following "requirements" (rules) [5]: 1) the volumes of use of renewable land and other natural resources should not exceed the volumes of their reproduction; 2) the use of non-renewable natural resources should correspond to the inclusion of their renewable substitutes in economic practice; 3) waste production should not exceed the assimilative capacity of the environment to absorb them.

Sustainable reproduction of land and natural resources includes increasing the scale of direct land restoration (reforestation, land recultivation, etc.), efficient and integrated use of natural raw materials, and protection of land and other natural resources and biodiversity. Such a way of land use is possible only based on scientific and technological progress and environmentally oriented structuring of the national, regional, and territorial-spatial land-use economy. In its turn, the land use economy necessitates the development of scientific principles of land management economics.

In production and economic practice, the laws of sustainable land use are realized through such individual





principles as scientificity, optimality, regionality and spatial territoriality, complexity, and a fee-charging principle. ***The principle of science*** implies that land use should be based on a deep knowledge of the objective laws of nature and society, and the latest achievements of science and technology. ***The principle of optimality*** implies ensuring the most efficient land use, choosing the best (or close to it) option for the reproduction of land and other natural assets, and optimal solution of economic tasks, taking into account social and environmental interests. ***The principle of regionality and spatial territoriality*** is based on the fact that land use is always carried out in a certain territory, taking into account its natural and economic conditions, and development prospects of specific regions and territories of territorial communities. ***Sectoral land use*** should take into account the environmental interests of land categories and land use types. ***The principle of complexity*** requires the rational use and deep processing of raw materials. The formation of territorial and production complexes and the development of enterprises should be based on waste-free or low-waste production. ***The fee-charging principle*** implies the compensatory use of land and other natural resources, their conservation, equalization of business conditions, and stimulation of highly efficient land use. It is important to emphasize that individual principles are necessarily considered in the context of general principles of land use: the primacy of nature, regulatory land use, socialization of land use, and ecologization of land use.

Thus, sustainable (balanced) development of land use is one of the significant priorities of the state, including land policy. At the same time, the current dynamics of the territorial and spatial development of land use, especially in rural areas, is characterized by bipolar results: on the one hand, intensive, environmentally unstable agricultural land use, and on the other hand, deepening processes of degradation of land and other





natural resources and biodiversity. The factor of sustainable (balanced) land use is very important and should be considered one of the main priorities for the implementation of the Sustainable Development Goals for Ukraine [6]. This is due to the national features of the structure of the agricultural and environmental land use economy, according to which land use in rural areas is extremely important. Conceptually, the priorities for the formation of a sustainable (balanced) land use model should be adaptively compared with the UN Sustainable Development Goals.

Sustainable (balanced) development of rural land use is a strategic task of the land policy, as well as a major priority of climate, food, and environmental security of Ukraine. Accordingly, the assessment of the level of sustainable (balanced) development of rural land use should be carried out using integrated indicators that reflect both economic and environmental, social, and institutional development indicators, which are key in the study of land management economics. When assessing the level of sustainable (balanced) development of rural land use, there is a problem with the availability of a large number of indicators characterizing the socioeconomic and environmental state of rural land use, which causes bias in the assessment results. To build an integral indicator, it is necessary to conduct a thorough study of the impact of each of the indicators on the final result of sustainable (balanced) land use, which will allow identifying the most important and rejecting the insignificant ones. The calculated indicators are selected based on statistical data (table 1).





Table 1.

**Indicators for assessing the level of sustainable
(balanced) land use in rural areas***

Components of sustainable development	Indicator
Economic	the level of gross agricultural output per unit area;
	the level of profitability per unit area;
	the level of land capacity (sectoral and/or integral);
	the level of land use value (regulatory and/or market);
Social	the ratio of household income to total expenditures;
	the level of gross value added per unit area;
	the level of rural unemployment;
Ecological	the level of anthropogenic pressure on land use;
	the level of environmental sustainability of land use;
	the level of environmental hazard of land use;
Institutional	performance of relevant functions by executive authorities and local self-government bodies;
	the level of fulfillment of the development programs goals;
	availability of a sustainable development strategy;
	availability of a strategy and a program for sustainable (balanced) land use development;

Generalized from sources: [7, 8]

This makes it possible to summarize information and make appropriate decisions to improve the conditions for the formation of sustainable (balanced) land use and the implementation of the basic principles of the concept of sustainable development by the methods of territorial-spatial planning of land use, land management, and land administration.

One of the main problems of environmental protection is the development of modern waste management systems, as the country has accumulated a significant amount of household and





industrial waste over several decades. There are numerous unorganized and unauthorized storages of various types of waste. Activities related to the utilization of waste, primarily secondary natural raw materials, which have great potential for the production of various types of biofuels, are unsatisfactory. This situation occurs due to a permanent shortage of financial resources allocated to the waste management industry. Perhaps the main problem here is the imperfect institutional environment for financial support of measures related to the improvement of waste management systems, which results in an excessively narrowed range of methods, tools, and forms of investment in waste disposal, storage, and recycling projects. Even the high resource value of certain types of waste, which is an extremely important factor of attractiveness in advanced countries, has not led to an acceleration of the production of various types of biofuels based on waste processing. Therefore, the development of a modern institutional environment for financial and investment support for the modernization of the waste management sector is an important problem of both theory and methodology, and practice of environmental economics.

The financial and investment support of the waste management sector is characterized by a set of distinctive features since waste is produced by the public (state and municipal), corporate, and household sectors. Each sector has its own specifics of waste generation and disposal, as well as different conditions for attracting financial resources for the development of the waste management industry. In addition, individual sectors have very different attitudes to setting waste management priorities, which is directly related to the need to diversify the forms and sources of financing for the processes of streamlining waste flows, including secondary natural raw materials. The unifying leitmotif of solving waste management problems in these sectors is to improve the institutional environment. In other





words, to form a set of rule-making institutions and organizations that will allow increased investment in waste management industry renewal projects and accelerating the implementation of foreign best practices for financial support for the processes of waste disposal, burial, neutralization, and recycling, including the recycling of secondary natural raw materials for the production of various types of biofuels.

While waste management in the public and municipal sectors is supported by public finances (state and local budgets) and is focused mainly on current financing, in the corporate sector, the main burden of financial and investment support falls on business entities, which will fully invest in waste management projects only if a set of incentives is available. The same situation is true for the household sector. This intersectoral distribution of the waste management sector largely determined the main trends in financial and investment support for the secondary resource management industry in 2007-2020, both in nominal and real terms.

In nominal terms, in 2007-2020, total waste management expenditures from all sources of financing correlated with the dynamics of the nominal value of other components of environmental protection, i.e., they tended to increase (fig. 2). In particular, in 2007, total waste management expenditures from all sources of funding amounted to UAH 2159.8 million, in 2009 - UAH 2328.3 million, in 2014 - UAH 6200.9 million, in 2018 - UAH 10012.3 million, and in 2020 - UAH 14097.0 million. In other words, in 2020, the nominal value of total expenditures for all sources of funding for waste management increased by 6.5 times compared to 2007.



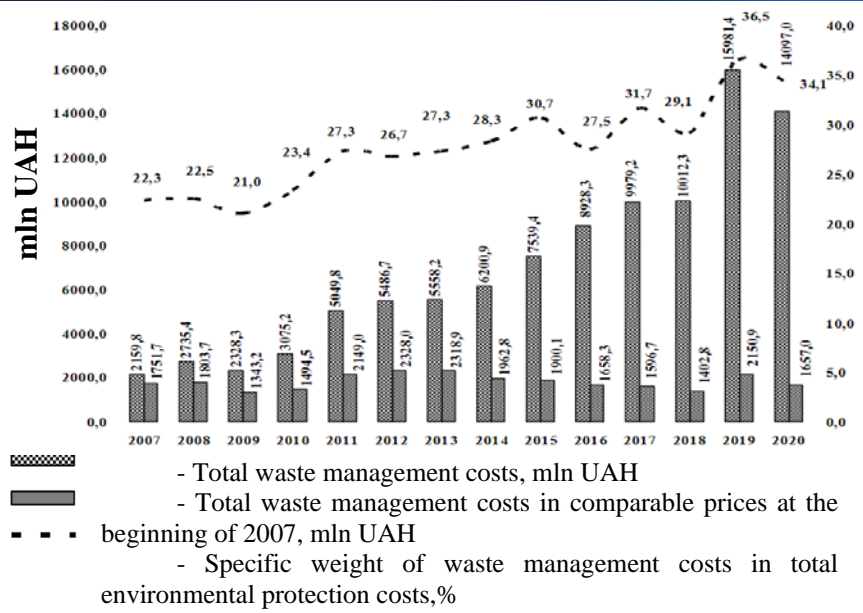


Fig. 2. Dynamics of total waste management expenditures in Ukraine by all sources of financing in 2007-2020

At the same time, the sinusoidal trend in the dynamics of total waste management costs by all sources of financing at comparable prices as of the beginning of 2007 (such costs were calculated by dividing the nominal value of this type of costs for the respective year by the cumulative price index of industrial producers) indicates that the accelerated growth rates of nominal amounts of financing for secondary resource use are due to inflationary and devaluation shifts, rather than qualitative changes in the financial and investment support of the waste management processes.

Despite the actual absence of real positive changes in the dynamics of total waste management expenditures by all sources of financing, in 2007-2020, there was no upward trend in the dynamics of the share of waste management expenditures in the total amount of environmental protection expenditures by all





sources of financing. In particular, in 2007, this figure was 22.3%, in 2010 - 23.4%, in 2014 - 28.3%, in 2018 - 29.1%, and in 2020 - 34.1%. This indicates that the real amount of funding for other components of environmental protection declined even more rapidly during the analyzed period.

Only quantitative positive changes in 2007-2020, except for 2019, are characterized by the dynamics of capital investment in waste management from all sources of financing. This is also confirmed by the low share of capital investments in total waste management costs by all sources of financing. In particular, in 2007, the number of capital investments in waste management by all sources of financing amounted to UAH 388.2 million, in 2013 - UAH 712.6 million, in 2018 - UAH 1182.1 million, in 2020 - UAH 2899.8 million. In general, the number of capital investments in waste management in nominal terms by all sources of financing in 2020 increased by 7.5 times compared to 2007 (fig. 3).

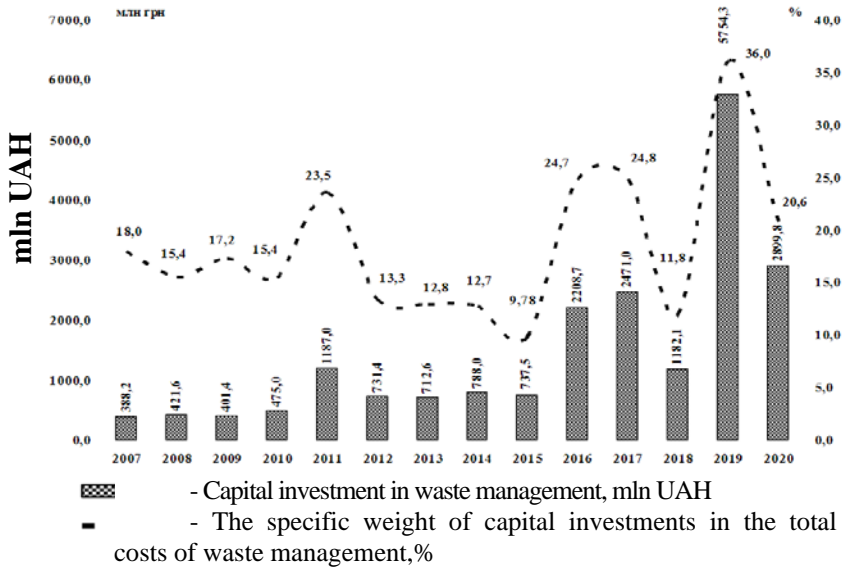


Fig. 3. Capital investments in waste management in Ukraine by all sources of financing in 2007-2020





At the same time, the share of capital investments in total waste management costs by all sources of financing in 2007-2020, with the exception of 2019, did not exceed 25%. In particular, in 2007, the share of capital investments in total waste management costs by all sources of financing was 18.0%, in 2010 - 15.4%, in 2013 - 12.8%, in 2018 - 11.8%, and in 2020 - 20.6%.

Such dynamics of the share of capital investments in total waste management costs by all sources of financing indicates that on average, 2/3 of waste management costs were directed to financing current costs, i.e., landfill personnel, utility bills, energy, etc. Only a small share of total waste management expenditures in 2007-2020 was allocated to modernization, reconstruction of existing and creation of new fixed assets of the secondary resource management industry, including recycling of secondary natural raw materials. If this situation is preserved, it will mean that the current trend rather than capital financing of the waste management sector will continue to dominate. This will not even provide the critical level of financial and investment support for the modernization and reconstruction of waste disposal, storage, treatment, disposal, and recycling facilities.

Positive aspects of the system of financial and economic support for waste management include the tools for public financing of waste disposal projects. While in 2007-2017, there was no clear downward trend in the dynamics of nominal expenditures of the Consolidated Budget of Ukraine for waste management, the dynamics of public expenditures in comparable prices at the beginning of 2007 generally showed a downward trend. A significant increase in the nominal expenditures of the Consolidated Budget of Ukraine for waste disposal occurred in 2018 compared to 2017 (an increase of UAH 796.5 million) (fig. 4).

Such an accelerated growth rate of nominal public expenditures on waste disposal in 2018 compared to 2017 led to





an almost double increase in the value of this type of expenditure in comparable prices. The same trend of growth in the nominal value of consolidated budget expenditures on waste disposal was also observed in 2019 and 2020.

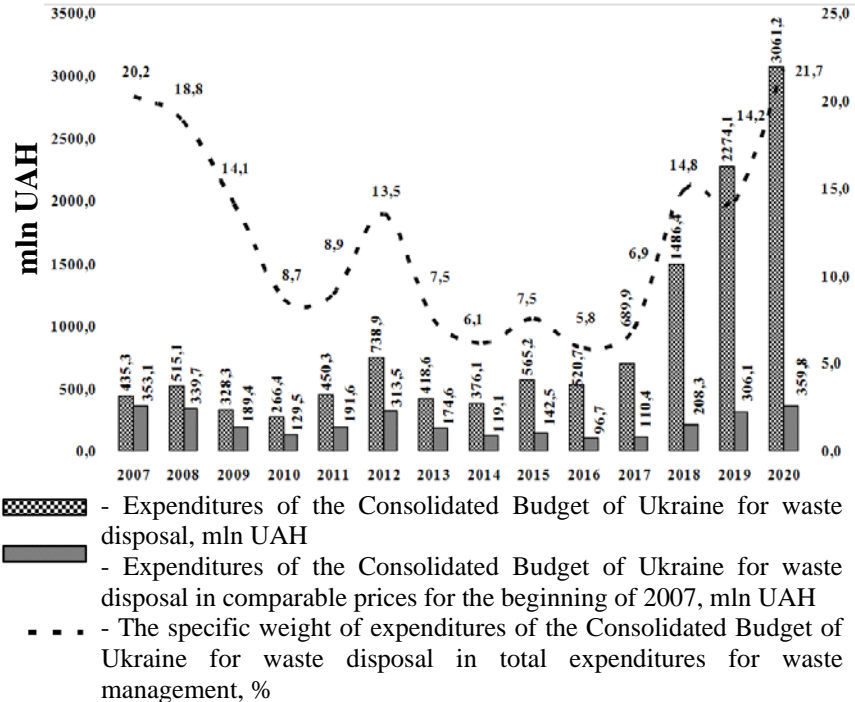


Fig. 4. Expenditures of the Consolidated Budget of Ukraine on waste management in 2007-2020

The high growth rate of nominal public expenditures on waste disposal in 2019-2020 led to an increase in the value of these expenditures in comparable prices in 2019 compared to 2018 - by UAH 97.8 billion, in 2020 compared to 2019 - by UAH 53.7 billion. From 2007 to 2020, the share of public expenditures on waste disposal in total waste management costs fluctuated between 5.8 and 21.7%. It was from 2018 to 2020 that the share





of public expenditures on waste disposal in total waste management costs increased significantly. It was because central and regional executive authorities and local governments began to pay much more attention to the production of various types of biofuels, which largely influenced the increase in the volume of waste disposal, including secondary natural raw materials.

As we can see, the situation with the environmental pollution in Ukraine was critical even before the full-scale invasion of Russia, as more than 500 million tons of waste were emitted annually, and only 25% of them were utilized. The war started by Russia has led to the destruction of infrastructure, significant pollution of the territory, and a decline in economic activity [9].

Increasing the volume of financial and investment support for waste management requires improving the institutional environment through the establishment of institutional rules and the formation of institutional organizations that will increase the level of interest of business entities and households to finance projects for the construction of new and modernization and reconstruction of existing landfills for industrial and household waste. It also requires increasing the level of utilization of secondary natural raw materials for the production of various types of biofuels and certain types of construction materials. Given the specifics of the waste management sector, a necessary condition for increasing the financial and investment support for projects to modernize the secondary resource management industry is the institutionalization of mortgage relations [10], expanding the list of public-private partnership agreements, forming an institutional framework for the development of cooperation in the field of secondary resource management, diversification of portfolio investment instruments for industrial and municipal waste disposal projects, in particular, through the issuance of municipal "green" bonds, institutional reformatting of





the existing methodological framework for calculating the environmental tax on waste disposal. These changes in the institutional environment of the waste management sector will make it possible to transform the fundamental conditions for the investment process for the placement, storage, disposal, neutralization, and disposal of industrial and household waste.

In the field of waste management, it is necessary to institutionalize two main models of partnerships between public (municipal) and private partners: 1st model – the creation of subjects of industrial and economic activity on the basis of municipal authorities (municipal enterprises), business entities and cooperative formations on the basis of the association of households, specialized enterprises for the disposal of industrial and household waste and financial and credit institutions; 2nd model - transfer of rights to use industrial and household waste dumps to business entities to eliminate unorganized and unauthorized dumpsites for household waste and production of solid waste. The second model is fully implemented through concession agreements between state (municipal) authorities and business entities that use waste dumps for their conversion into biofuel and various types of materials, including construction materials. In the conditions of institutional turbulence and disorganization of basic environmental management institutions, the institutionalization of the partnership model 1 is less risky, as it ensures direct control of state and local authorities over the use of resource value of industrial and household waste by business entities, as well as compliance with environmental legislation in terms of collection, storage, sorting, neutralization, and utilization of various types of waste, including secondary natural raw materials [11].

In the context of establishing the process of organized storage and disposal of household waste generated in the household sector, an extremely important component of





improving the institutional environment for waste management is the institutionalization of cooperative entities based on the consolidation of organizational efforts and financial capabilities of households in the form of service cooperatives, whose main mission will be to develop the infrastructure for centralized collection, storage, and disposal of waste. Such cooperative entities will ensure a qualitatively higher level of waste management, primarily in rural areas, which will gradually reduce the number of unorganized and unauthorized waste dumps around settlements and on forestlands. Cooperative entities will be able to act as one of the parties to public-private partnership agreements along with local governments and regional state executive authorities, which will help consolidate the financial potential of both local authorities and the household sector.

A prerequisite for the formation of a modern institutional environment for the functioning of the waste management sector is the development of effective tools for fiscal influence on secondary resource use, since the early 90s of the last century and to this day, the system of fiscal regulation of waste production, placement, utilization and disposal is characterized by an excessively narrowed range of regulators, which does not provide appropriate incentives for the rational use of the resource value of various types of waste. The environmental tax rates for waste disposal within limits and for excessive disposal are not differentiated, so industrial enterprises take the path of least resistance, disposing of waste at landfills rather than financing measures to recycle it more effectively.

In the current economic environment, it is important to institutionalize a system of differentiation of environmental tax rates for waste disposal that would provide minimum rates for waste incineration for energy production. The lowest rates of environmental tax for waste incineration for energy production will allow solving the problem of solid and gaseous fuel





production and thus reduce the need for fossil fuels, which are in short supply in Ukraine. Thus, the introduction of reduced rates of an environmental tax on waste incineration for energy production will solve not only the problem of reducing the burden on ecosystems by reducing the amount of waste disposed of at landfills but also the problem of diversifying energy sources for the industrial complex, united territorial communities and households. This approach to differentiating environmental tax rates should be implemented in the system of financial regulation of secondary resource use and energy-efficient environmental management. The highest rates of environmental tax for mechanical disposal of waste at landfills should be legalized, which will force business entities to ensure the disposal of industrial waste, and municipalities and households to ensure the disposal of household waste.

The formation of a modern economic mechanism for environmental management, taking into account the main environmental trends, should be based on the principle of sustainability. This principle means programming such rates and scales of economic development of certain types of natural raw materials and non-raw material assets that will make it possible to form the material base for processing units of the natural resource sector, as well as for the production of solid, liquid and gaseous fuels while ensuring sufficiently high rates of reproduction of the natural resource potential and increase of certain components of biodiversity.

Adherence to this principle by direct natural resource users will be possible if a set of incentives is institutionalized that will encourage natural resource entrepreneurs to ensure the reproduction and augmentation of natural assets along with the development of the natural component of national wealth.

Based on the main trends in the implementation of the policy of decentralization of power and local government reform,





the principle of decentralization should be taken into account when choosing priorities for institutionalizing methods and tools of the economic mechanism of natural resource management. This principle will make it possible to form a package of methods, tools, and levers of regulatory influence on natural resource users at the regional and local levels to the maximum extent possible to link the priorities of economic development of natural resource potential with the priorities of development of territorial communities, primarily territorial communities of the basic level.

Under such conditions, local governments will use the entire arsenal of regulators to ensure that the process of natural resource management meets the needs of the local population and local businesses to the maximum extent possible, which will ultimately contribute to the growth of synergies in both the economic and environmental sectors.

Ukraine has chosen integration into the European Union as its main foreign policy priority, which also means gradual integration of the national environmental architectonics into the regulatory mechanism of environmental management that operates in this regional association. Under such conditions, the principle of convergence, i.e. gradual convergence of the global, European, and Ukrainian regulatory environmental structures, should become the necessary principle for the formation of the national economic mechanism of environmental management. First, it is necessary to complete the documentary and actual implementation of European environmental directives, accelerate the process of integrating the Global Sustainable Development Goals and the priorities of the New Climate Agreement concluded at the end of 2021 into national environmental policy, and prepare the national economy for the EU's planned border carbon adjustment.





The diversification of economic activities and services creates a need to coordinate economic, social, and environmental priorities. At the same time, it is necessary to maximize both economic benefits and environmental dividends. That is, when programming a promising economic mechanism for environmental management, the principle of synergy in the contour of economic, socioeconomic, and environmental priorities should be taken into account.

It is also necessary to take into account the principle of institutional coherence, i.e., changes in some legal acts should be correlated with changes in other regulatory documents to prevent the emergence of a set of institutional traps and institutional gaps. In this regard, the proposed changes should be subject to a thorough examination to eliminate, at the initial stages of institutional design, the existing contradictions concerning the legal basis for the use, ownership, and disposal of natural assets, as well as the organizational and legal forms of business activity in the field of economic development of natural resource potential.

The principle of obtaining global benefits should become one of the main ones both in the formation of national environmental policy and the choice of forms of cooperation between the Government and united territorial communities with international environmental funds in the implementation of environmental projects. This will allow the available financial resources for environmental protection, which are provided by public budgets, as well as enterprises' own funds, to be supplemented by significant flows of foreign environmental investment.

According to the National Recovery Plan, the Ukrainian government sees the potential for Ukraine to ensure a green transition to a new green economy that is fully integrated into the European economy and will become a key element in building





the EU's strategic autonomy. The Eco-Recovery component, which will ensure Ukraine's green transition, consists of 4 pillars: 1) architecture and finance of climate governance; 2) clean energy and green buildings; 3) new green economy; 4) preserved environment and developed biodiversity.

Ukraine has a strong industrial potential and a surplus of natural resources that can support Europe's green transition. The war resulted in the demolition of more than 100 industrial production facilities and the blockade of seaports that exported more than 70% of its products, leading to an economic decline of 30%. The new green economy of Ukraine will be aimed at building a new sustainable economy that will provide resources and skilled labor to transform Ukraine's infrastructure. Ukraine's realized economic potential will strengthen the EU's autonomy and support Europe's green transition through 1) modern natural resources such as lithium, titanium, and cobalt; 2) clean energy to be exported to the EU; 3) green industrial products such as green steel, batteries, and renewable energy to be produced in Ukraine; and 4) safe and high-quality agricultural products that will strengthen Europe's food security. Therefore, the following initiatives are proposed:

- rebuild production facilities using energy-efficient technologies that would ensure the competitiveness of the economy, reduce the carbon footprint and significantly reduce air pollution;

- transition to new technologies that rely on carbon-neutral energy resources;

- integrate into European food, energy, and industrial value chains in the new green economy;

- develop a circular economy that will ensure efficient waste management and reuse of resources.

The development of a new green economy will ensure the competitiveness of Ukrainian products on the world market and





ensure European economic sustainability, providing Europe with essential resources, products, and services [9].

Thus, the model of sustainable (balanced) land use for Ukraine is an extremely broad concept and should be considered as a socioeconomic and ecological system that covers agricultural, environmental, recreational, and other land use, its ecologization, capitalization, socialization, territorial and spatial development. Accordingly, the economics of land management is the result of modeling sustainable land use. Accordingly, from the point of view of economic science, the ecological sector, as the basis for sustainable land use, is not the natural environment of the land use system, but the environmental and resource-saving work associated with its reproduction. Reproduction of the living nature of the land and other natural resources, and their protection is one of the phases of land and nature use. The other two: the exploitation of land and other natural resources, and the processing of natural substances - belong to the real economy. The system of sustainable land use covers two interrelated subsystems: social production (identification, extraction and processing of natural substances) and the ecological sphere itself (targeted production of ecosystems).

To solve one of the main problems of environmental protection, namely, the development of modern waste management systems, it is necessary to form an institutional environment for secondary resource use, taking into account the basic trends of transformation processes in the natural resource sector, decentralization and European integration processes. The main components of the formation of the institutional environment for the functioning of the waste management sector, taking into account decentralization, and European integration processes, are the institutionalization of public-private partnership agreements; creation of an institutional framework for the development of cooperation in the field of waste





management; transformation of the system of fiscal regulation of waste management processes through deepening the differentiation of environmental tax rates for waste disposal.

The principles of systematicity, proportionality, and regularity that underlie the formation of an economic mechanism for environmental management should be supplemented by the following principles: sustainability, decentralization, convergence, synergy, institutional coherence, and global benefits. This will make it possible to use the full range of external and internal benefits that have arisen in connection with the transformation of the global environmental architecture and decentralization of power when using regulatory approaches to the more economical use of primary natural resources and environmental protection. These principles should also serve as basic provisions when choosing priorities for the tools and levers of the economic mechanism of environmental management. It is necessary to implement the best foreign practices of environmental management regulation in the domestic sphere and diversify investment flows into environmental projects. It is necessary to implement a set of measures aimed at shaping the worldview of natural resource users to reflect the system of values promoted by international environmental conventions.

References:

1. Tretiak, A. Tretiak, V. Pryadka, T. Trofimenko, P. and Trofimenko, N. (2022), *Zemel'ni resursy ta ikh vykorystannia [Land resources and their use]*, Belotserkivdruk LL, Bila Tserkva, Ukraine.

2. Rio Declaration on Environment and Development (1992), Adopted by the United Nations Conference on Environment and Development, Rio de Janeiro, June 3-14, URL: https://zakon.rada.gov.ua/laws/show/995_455#Text





3. Tretyak, A.M., Hunko, L.A., Medynska, N.V., Hetmanchyk, I.P. A significance of method of design of land use of local eco-network structural elements. *Int. J. Adv. Sci. Technol.* 29 (6 Special), 1094–1100 (2020)

4. Hunko, L. (2022), “Formation of sustainable (balanced) land use — basis of economic development of land planning in Ukraine”, *Agrosvit*, vol. 9-10, pp. 51–61.

5. Robert Costanza (1989), What is ecological economics? *Ecological Economics*. Vol. 1, No 1, P. 1-7.

6. On the Goals of Sustainable Development of Ukraine for the period up to 2030: Decree of the President of Ukraine of 30.09.2019 № 722/2019. URL: <https://www.president.gov.ua/documents/7222019&29825> (access date: 27.01.2022).

7. Lisovy, A.V. (2007), “Methodical approaches to the assessment of rural areas of Ukraine”, *Ekonomika APK*, vol. 8, pp. 123–130.

8. Tretiak, A. Tretiak, V. and Malashevskaya O. (2019), “Estimation of efficiency of land management and land management”, *Ekonomika pryrodokorystuvannia i stalij rozvytok*, vol. 5 (24), pp. 91-95.

9. Brief reviews of public policy regarding reconstruction of Ukraine, Lugano 4-5 July 2022 - Policy brief - Ukraine Recovery Conference, 2022. [Electronic reference]. – Access mode: <https://ua.unc-international.com/ukraine-recovery-conference-2022-mizhnarodna-konferenciya-z-pitan-vidnovlennya-ukrayini>

10. Medynska, N.V. (2021), "Investment support in the field of waste management as a component of the economic mechanism of nature management", *Prychornomors'ki ekonomichni studii*, vol. 72, no. 2, pp. 63-69.

11. Medynska, N., Kolganova, I. and Zadorozhnia, N. (2017), “Ecological-economic assessment of using of lands of settlements”, *Agrosvit*, vol. 21, pp. 26–29.

