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DEVELOPMENT OF ECOLOGICAL ENTERPRISE IN CONDITIONS OF USE OF TECHNOGENIC LAND

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The present state of development of environmental entrepreneurship in conditions of technogenically disturbed regions is determined. The main types of products that could be created within the framework of ecologically oriented business activities with the use of land, reclaimed in open mining conditions, were determined. The comparative characteristic of ecologically-oriented areas of economic development of technogenic land is given. The recommendations on the planning of the structure of technogenic lands were given, focused on the development of environmental entrepreneurship.

Keywords: environmental entrepreneurship, technogenic lands, land reproduction, ecologically-oriented land use, structure of technogenic lands.

Statement of problem. Environmental entrepreneurship as a type of economic activity becomes more and more important in the conditions of general deterioration of the ecological state of regions, cities and other territorial entities both at the local and global levels. The growth of public consciousness and the aspiration of an increasing majority of the population to gain access to living conditions promoting to maintain health and create comfortable environmental conditions of life, forms the economic

preconditions for the development of business, focused on the production of a useful product with minimal damage to the environment or product, a significant part of which reflects the costs associated with the improvement of the state of natural ecosystems.

In particular, the activity is aimed at creation of environmental protection products and provision of corresponding services in territories characterized by a high level of technogenic loading, low investment attractiveness as a result

of unresolved environmental problems, are limited suitable for the development of traditional areas of management and reveal a negative dynamics of the main indicators of socio-economic development. Such territories, taking into account their ecological status, require a long period of rehabilitation that does not correspond to the interests of land users, aimed at the rapid return of investments in improvement of land, in the management of using land funds. Instead, entrepreneurs who invest in the development of environmental protection technologies could consider technogenical land as a value object that can be increased, improving its environmental and consumer characteristics. Thus, today the search for ways of organizing ecological entrepreneurship is urgent, based on the use of technogenical land for the purpose of their gradual transformation into ecologically safe and investment-attractive land.

Analysis of recent papers. Determining of the direction of reproduction of land after open mining is a key aspect in ensuring of their investment attractiveness and environmental sustainability. In this aspect, Drebenstedt C. [1] indicates that the planning of the structure of technogenic lands needs to take into account not only the economic consequences of land transformation, but also the level of change in the social and environmental systems that have undergone mining intervention.

In the source [2] it is noted that in conditions of general deterioration of land quality in developed countries, it is necessary to strive for forms of land use, which promote the preservation of soil fertility, oriented on long-term and stable management. It is noted that more research is needed to determine the relationship between crop rotation, the combination of different crops and the improvement of the organic component of the soil. At all times, the load on the earth exceeds their ability to self-healing. This requires looking for directions of non-exhaustible forms of land use, which would, however, satisfy the economic needs of society and specific land users.

The nature of land changes after open mining is so significant that it radically changes the possibility of returning to the forms of land use that existed before the development of the deposit. No interference with natural processes is so devastating and long-lasting in its effects as the

development of minerals in an open way. After open development instead of fertile land there are substrates, which causes long-term restrictions on agricultural use of these lands [3].

The source [4] states that reclamation should not be seen as an attempt to replace natural processes in the formation of land, but instead it should give a boost precisely for the development of soil formation on the basis of reproduction of the natural cycle of substances in the depth of the soil. To this end, it is not necessary to distinguish between different types of land use, but to combine them according to the principles of ecologically-oriented land use.

Thus, based on the analysis of recent research on issues of ecologically oriented use of land of technogenic origin, the problem of substantiation of the possibilities of implementing environmental entrepreneurship with the use of land that is limited suitable for the traditional forms of land use.

Aim of the paper. As a research objective, it is necessary to determine the grounds for the scientific basis for choosing the areas of development of environmental entrepreneurship business with the use of land of technogenic origin, which is limited suitable for traditional forms of land use.

Materials and methods. Today, the activities of enterprises in all sectors of the economy are increasingly assessed through their achievements in environmental and social affairs [5]. Increasingly important in the business activity is the orientation of operational and production processes in non-exhausting nature management, on increasing the share of environmental utility in the aggregate cost of the created goods and services.

In this aspect, environmental entrepreneurship is a higher level of orientation of enterprises to achieve the environmental goals of the development of society. Its main purpose is to produce products or provide services that serve the purpose of improving the status and preservation of the main elements of the environment. In this case, ecologization of chains of creation of values and stages of the life cycle of the corresponding products and services is envisaged.

Environmental entrepreneurship is an activity focused on the market of environmental products and aimed at profit by meeting the public needs in creating environmentally favorable

living conditions. In conjunction with the use of land resources, as the main means of production, environmental entrepreneurship can be implemented in the following activities:

1) production of products that corresponds the requirements of environmental safety of its consumption (environmentally pure products). However, for this purpose, it is necessary to take measures to completely clean the land from pollutants.

2) the foundation of types of land use, oriented to the non-exhaustive use of ecological functions of land (for example, the creation of green tourism zones, recreation, hunting, fishing, sports grounds, etc.).

3) production of products, which allows replacing the use of more harmful for the environment products (for example, on the reclaimed lands, installations for the generation of solar, wind power as alternative fuel sources of electricity). It should be noted that the exposure of technogenic lands may be more favorable for generation energy from renewable sources.

4) establishment of lands that would fulfill environmental protection functions, including in relation to new land (forest parks, biosphere parks, nature reserves, etc.). Concerning the latter, it should be noted that a certain isolation of open-cast areas contributes to the return of those biological species that avoid contact with humans. For example, in the area of the damaged areas in the German brown coal basin Lausitz, in the area between the settlements of Cottbus and Bautzen, since the 1990s, there has been an appearance and increase in the population of wolves that have been missing for the past 150 years in Germany [6]. Today the population is more than 20 individuals, each of which uses about 330 km² for hunting purposes. Due to the appearance of predators there was an opportunity to organize paid excursions in the territory, that was left without reclamation in the previous economic area after the completion of extractive activities [7].

Over the territory of the Rhine Coal Basin, over 2200 species of animals and 800 plant species, which began to develop in areas of technogenic origin, were recorded due to the reclamation of technogenic lands. Thus, the reclaimed areas of the biodiversity potential are not inferior to indigenous lands over time. Often the biological diversity of technogenic lands even exceeds

the species composition of living organisms inhabiting undisturbed lands, for example, agricultural purposes [8, p.60].

It should be noted that the transfer of land of technogenic origin to self-remediation processes does not require substantial funds for land reclamation, and although it will facilitate the return of certain species of plants and animals to waste areas, but will not restore their biodiversity and environmental safety. Ecologically oriented forms of land use after open mining must be carried out purposefully, taking into account the possibility of further profit from the use of land of technogenic origin.

The production of environmentally pure products, as a direction of environmental entrepreneurship, involves the creation of agricultural land, characterized by high fertility. In this area of activity is prohibited the use of artificial fertilizers to improve soil productivity, which attaches great importance to the restoration of natural fertility of the soil. Instead, ecological production of agricultural products creates optimal conditions for the development of biological organisms in a thicker soil, which contributes to the process of formation and accumulation of humus. The combination of various crop rotations and annual green coverage of technogenic lands protect the soil surface from waterlogging and erosion, and contribute to its rooting, which in turn serves as a nutrient base for biological organisms and improves the physical structure of the earth [9].

The basis of ecological-oriented types of land use should be the implementation of green spaces, that is, the greatest proportion of such land use should occupy the forestry direction of land reclamation. Forest plantations will promote the increase of biodiversity on technogenic lands, stabilization of water regime of sites, air purification, protection of soils from erosion processes, activation of soil formation process. At the same time, forestry reclamation should be supplemented by other types of land-use, which are ecologically oriented.

It should be noted that in Ukraine the agricultural direction of land reclamation remains, caused by mining developments. For example, at the Ordzhonikidzevsky GOK (OGOK), for the period from 1962 to 2004, 6803 hectares of land was restored, the economic structure of which is reflected in Fig. 1. The same direction of land

reclamation is characteristic for the regions of intensive agricultural production, on the territory

of which are placed the most valuable for cultivating agricultural crops of land.

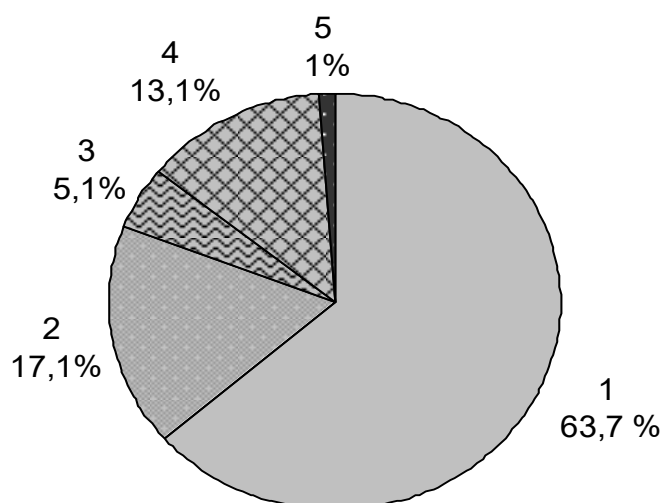


Fig. 1. The economic structure of the area of land reproduced at Ordzhonikidzevsky GOK: 1-agricultural land; 2- forestry; 3-water management; 4-building; 5-other

The expediency of establishing these types of land use in the framework of the development of environmental business depends, first of all, on the level of demand for the corresponding products and services. However, there are specific factors for each direction that will result in a decision on the target use of re-cultivated land [10]. Thus, in particular, the factors hindering the development of ecotourism are the lack of socio-political and economic conditions favorable to investments in the development of ecotourism, lack of sufficient experience and knowledge in the organization of ecotourism, in particular, in the field of marketing, pricing, imperfection, and even lack of specialized routes and programs for different categories of ecotourists, insufficient level of environmental safety of objects of technogenic origin. The production of environmentally pure products is associated with its higher cost, which, against the background of general impoverishment of the population, limits the possibilities for the sale of this product. In addition, technogenic lands are chemically polluted, which requires significant costs to eliminate (neutralize) environmentally hazardous elements in the soil. Regarding the territories that would perform environmental protection functions, provided that the state funding of environmental protection programs is limited, the mechanism of the formation of the yield of their landowners remains unregulated.

It is important to emphasize that the sub-

urbs in the conditions of total urbanization are becoming more attractive not only for the needs of recreation, but also for residential and industrial construction. Accordingly, the monetary value of these lands will increase in comparison with the value of agricultural land, where per unit of land will have a smaller amount of capital investment and, due to this, the profitability of the restoration work will be formed.

It should be noted that the potential of tourism and recreation is not enough in Ukraine - only 7-9%. However, this industry has a number of significant benefits in terms of its effective development, since the cost of creating one job here is 20 times smaller than in industry, and the turnover of investment capital is 4.2 times higher than in other sectors. As a rule, in order to save money on reclamation and for the ecological stabilization of the area for reclamation, the share of forestry lands [11], which is favorable for the development of green tourism and active recreation, is increasing.

From the analysis of market factors of the development of environmental entrepreneurship on technogenic lands, it follows that the very foundation of such types of land use as areas for green tourism, fishing, hunting, sports and leisure activities are most promising in terms of the formation of future land tenure yields.

The possibilities of organizing ecologically-oriented forms of land use in areas of technogenic origin, besides the factors of market nature,

depend on the duration and intensity of land transformations that it undergoes during the technological stages of the development of the deposit. Duration of mining works is determined by the type of raw material, its balance stocks, the production capacity of the mining enterprise, the production technology and the level of demand for this raw material in the market. The duration of work on reproduction of land is determined by the level of their financing, the purpose of the soil, their state and the chosen reclamation scheme. However, the longer the term for the extraction of land, the greater the environmental damage it suffers. In this aspect, it is important that the planning of future areas of land use is consistent with technological decisions regarding the degree and duration of land violations during the development of a mineral deposit.

Thus, technological means of extraction are decisive in terms of the extent of the violation of land under open mining conditions. From the organizational point of view, for the purpose of organizing ecologically oriented areas of land use, it is necessary to coordinate technological decisions regarding the planning of mining objects with the requirements of the following land use regarding the quality of the condition of waste and reclaimed lands. Only under the condition of the lowest level of damage to land at the stage of their mining operation is a possible transition to forms of land use that correspond the requirements of environmental entrepreneurship.

The development of natural resources consists in their exploration, detection, assessment, introduction into the cadastre by types (tax accounting of forests, land cadastre, water inventory, determination of mineral reserves, etc.), as well as direct use and protection against depletion, productivity support, and, finally, restoration (rehabilitation of landscapes and soils, restoration and strengthening of shores of reservoirs, afforestation, etc.). The feature of fossil natural resources is that their use is impossible without disturbing other elements of the environment. At the same time, environmentally responsible development of mineral resources should provide for the minimum possible use of other geologically related resources. Thus, under the limited use of natural resources, mining is understood as their use at the minimum allowable volumes, based on the economic feasibility of production,

technological feasibility of the production processes of mining and processing of minerals, the degree of violation of the associated natural resources used for the named processes, according to the possibility their subsequent recovery and the level of negative impact on the health of the population living in the mining industry. A feasible technology for the open development of the deposit for a limited violation of natural resources, on the one hand, should ensure the extraction and processing of minerals with the permissible material costs for these processes, on the other - with the permissible violation of the territory adjacent to the quarry, providing normal conditions of life of its population. Mining company should not yield to environmental interests for the sake of low costs for the production of its products. Thus, the choice of an effective relationship between the method of disclosure and the field development system is decisive in terms of the extent of the violation of land under open mining conditions (Fig. 2).

The specified relationship between the way of disclosure and the development of a quarry field should provide favorable conditions for the entire open space to be covered with open-pit quarries. This will enable the preparation of a larger amount of land under forestry reclamation and minimize the placement of these breeds from the outside of the career path under the project, which will ensure preservation of the original forms of relief and ecological functions of land that does not fall under the external dumps.

Therefore, the choice of a technological scheme with a limited violation of natural resources should be based on the justification of the method of disclosure and the system of development of a horizontal field as the determining factors of limiting the scale of the impact of mining development on the natural environment. In this case, the benefits of using the land of technogenic origin will be created for the development of various forms of environmental entrepreneurship.

It should be noted that entrepreneurs who produce products or provide environmental protection services using land of technogenic origin could obtain competitive advantages and additional resources for the development of their business due to the following factors:

– increase of investment attractiveness, reputation of its business, focused on environ-

mental protection;
 – Increasing motivation to implement ecologically-oriented innovations;
 – reduction of risks associated with the use of land of technogenic origin;

– creation of more favorable and safe conditions of work and leisure;
 – decrease in resource consumption of the product.

Technological approaches that limit the developed space of a career

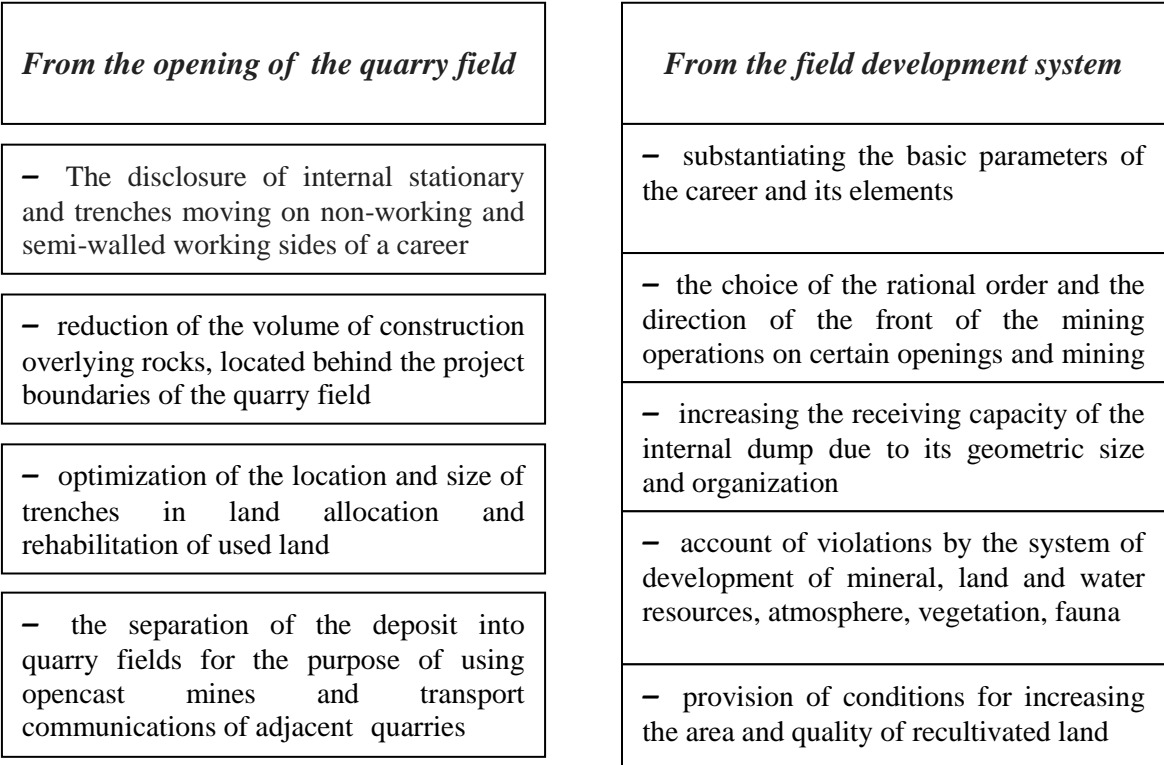


Fig. 2. Substantiation of technological decisions on the choice of a technological scheme with a limited violation of natural resources

In deciding on the structure of recreated landscapes after mining, it is necessary to determine the advantages and disadvantages of topical areas of land use for their compliance with the objectives of environmental entrepreneurship (Table 3).

The basis for choosing an ecologically oriented land use after open mining should be to compare the expected benefits from land use and the cost of reclaiming technogenic lands in a particular direction of management. The task of organizing environmental entrepreneurship on technogenic lands should be to identify as many more useful properties of the land that could be used to form the value of the product, the consumption of which will reduce the technogenic burden on the environment.

Conclusion. Environmental entrepreneur-

ship on technogenic lands should promote the development of non-exhausting forms of land use, focusing on the creation of products for environmental protection purposes, or products whose production does not cause damage and degradation of ecosystems. Proceeding from foreign experience, the most important directions of ecologically-oriented economic development of land disturbed in the course of mining: they are the creation of forest lands in combination with reservoirs of recreational purposes, which allows to stabilize the regime of ground waters of disturbed territories, to restore the soil cover and increase its biodiversity.

The features of the relief of technogenic landscapes also allow them to be used as a spatial basis for the generation of wind and solar energy. Also, the development of environmental

tourism, and activities related to the restoration of ecological systems on technogenic lands, should be considered as promising areas of environmental entrepreneurship in industrialized regions. Accordingly, the affected area, subject to

the intensification of successional processes, may turn into hangover game nurseries, in order to grow ungulates and feathered game, in the event of their remoteness from large settlements.

Table 3

Comparative estimation of attractiveness of land development for ecologically-oriented areas of management

Direction of Reclamation	Advantages	Disadvantages
Agricultural	Creation of non-agricultural lands contributes to the stabilization of soil-forming processes and the restoration of the disturbed soil structure.	It will require substantial recovery costs. A long period of stabilization of soil-forming processes.
Forestry	Supports ecological functions of the land. Suitable for sloping forms of landscapes. Resistance to natural degradation. It does not require high levels of ground bonus. Ability to diversify the use of forest products.	Long-term period of obtaining economic effect of land use. Relatively low level of profitability of the land.
Water management	Relatively small investment, supports the biodiversity of the region, organically complements other areas of land use.	Low profitability of the land. Probability of unfavorable chemical composition of water, low water flow rate. Long period of ecological stabilization of the land.
Hunting	Ability to quickly get income from land use. The possibility of attracting low-grade lands - ravines, pylons, dumps, and the like.	Possible migration of wildlife, unwanted contacts with locals.
Sanitary	Mitigates the negative environmental impacts of mining, contributes to the safety of the population of the surrounding area, the minimum cost of reproduction.	Limitations (unattractive) of economic use, chemical and physical loading on soils.
Recreational	Adaptability of the landscape to any economic structure of the locality. Positive impact on the value of real estate in the region and the attractiveness of living.	Requires compliance with high environmental standards. Possible restriction of access of the general population.
Succession	Contributes to the restored biogeocoenoses of technogenic areas, resistance to degradation, positive environmental impact on the surrounding area.	The existence of the risk of spontaneous habitation of biological species, non-typical for disturbed terrain, the removal of land from productive use, a special access regime for natural objects.

In order to accelerate the development of technogenic lands for the production of environmental protection products, technological solutions for planning mining objects should be oriented towards the formation of those forms of relief waste land, which are most favorable for a particular area of land use. Bringing the scale of land mines to mining to the minimum required level is a prerequisite for preserving their natural resource potential and functional properties, which will allow them to start the use of these lands faster for the needs of environmental entrepreneurship.

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РОЗВИТОК ЕКОЛОГІЧНОГО ПІДПРИЄМНИЦТВА В УМОВАХ ВИКОРИСТАННЯ ЗЕМЕЛЬНИХ УГІДЬ ТЕХНОГЕННОГО ПОХОДЖЕННЯ

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Визначений сучасний стан розвитку екологічного підприємництва в умовах техногенно уражених регіонів. Визначені основні види продукції, що могли б створюватись в рамках еколого-орієнтованих напрямів підприємницької діяльності з використанням земельних угідь, відтворених в умовах відкритих гірничих розробок. Надана порівняльна характеристика еколого-орієнтованих напрямів господарського освоєння угідь техногенного походження. Надані рекомендації щодо планування структури техногенних угідь, орієнтованої на розвиток екологічного підприємництва.

Ключові слова: екологічне підприємництво, техногенні угіддя, відтворення земель, еколого-орієнтоване землекористування, структура техногенних земель.

РАЗВИТИЕ ЭКОЛОГИЧЕСКОГО ПРЕДПРИНИМАТЕЛЬСТВА В УСЛОВИЯХ ИСПОЛЬЗОВАНИЯ ЗЕМЕЛЬ ТЕХНОГЕННОГО ПРОИСХОЖДЕНИЯ

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Определено современное состояние экологического предпринимательства в условиях техногенно нарушенных регионов. Определены основные виды продукции, которые могли бы создаваться в рамках эколого-ориентированных направлений предпринимательской деятельности с использованием земельных угодий, восстановленных в условиях открытых горных разработок. Предоставлена сравнительная характеристика эколого-ориентированных направлений хозяйственного освоения угодий техногенного происхождения. Даны рекомендации по планированию структуры техногенных угодий, ориентированной на развитие экологического предпринимательства.

Ключевые слова: экологическое предпринимательство, техногенные угодья, восстановление земель, эколого-ориентированное землепользование, структура техногенных земель.

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