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Improvement of economic incentive mechanism for environmental management

Abstract. For the purposes of developing and improving the system of nature use administration and the role of charges for negative impact on the environment in targeted financing of environmental protection measures and stimulation of rational nature management, we have analyzed the structure of economic mechanism of environmental management and have considered foreign experience of economic regulation of negative impact on the environment. The principles of a systematic approach to the study of ecological and economic development were the methodological basis of our research. Special attention has been paid to the incentive function of economic mechanism of environmental management. Increasing the role of this function can be achieved through the use of the authors' system of fine sanctions being applied in the environmental sphere. They are calculated on the basis of manmade load on the environment and human health. As a negative effect indicator of enterprises' performance, we propose to use the magnitude of risk for the health of population being located within the impact area.
Keywords: Nature Use Administration; Environmental Management; Economic Mechanism; Incentive Function; Charges for Negative Impact on the Environment; Fine Sanctions
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Посилення стимулювальної функції економічного механізму управління раціональним природокористуванням
Анотація. З метою посилення ролі платежів за негативний вплив на навколишнє середовище у фінансуванні природоохоронних заходів і забезпечення раціонального природокористування нами проаналізовано структуру економічного механізму менеджменту довкілля. Особливу увагу автори приділяють стимулювальній функції, підвищення ролі якої може бути досягнуте за рахунок використання розробленої авторами системи штрафних санкцій, спрямованих до природоохоронної сфери. Вони розраховуються виходячи з величини ризику здоров'ю населення, яке потрапляє в зону техногенного впливу.
Ключові слова: адміністрування природокористування; управління природокористуванням; економічний механізм; стимулювальна функція; плата за негативний вплив на навколишнє середовище; штраф.

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Усиление стимулирующей функции экономического механизма управления рациональным природопользованием
Аннотация. В целях усиления роли платежей за негативное воздействие на окружающую среду в финансировании природоохранных мероприятий и обеспечении рационального природопользования проанализирована структура экономического механизма управления. Особое внимание авторы уделяют стимулирующей функции, повышение роли которой может быть достигнуто за счет использования разработанной авторами системы штрафных санкций, направляемых в природоохранную сферу, рассчитываемых исходя из величины риска здоровью населения, попадающего в зону техногенного воздействия.
Ключевые слова: администрирование природопользования; управление природопользованием; экономический механизм; стимулирующая функция; плата за негативное воздействие на окружающую среду; штраф.

1. Introduction. Economic security has a special place in the system of national public security. It is a material basis for sustainable development of the state. It is necessary to consider economic security in relationship and interdependence with environmental safety, as economic and political stability of a country is impossible without solving ecological problems [1]. The main objective of environmental policy is that economic growth should not be accompanied by increasing pressure on the environment; however, meeting this requirement will also ensure the efficiency of economy in the long term and competitiveness of goods in the global market. The relevance of the study lies in the need to improve economic instruments while implementing environmental programs.

Because of the close interdependence of ecological and economic security, the economic mechanism of nature use and environmental protection is of great interest.

The world practice of using economic mechanisms of environmental management differs from the Russian experience by the capability of the incentive system to effectively reduce the negative impact of economic activities. This system includes tax credits. For example, environmental technical equipment is sold in Germany, France, Japan, the USA with tax credits; there are benefits for accelerated depreciation of pollution control

equipment in Canada, Austria, Germany; subsidies for municipalities and businesses and preferential loans for environmental protection equipment are applied in Japan [2].

As it was noted in the study of A. I. Kopytova (2012), economic instruments for environmental protection in Russia are fragmentary [3]. Payments and taxes for the natural resource use and environmental pollution occupy a central position in the economic mechanism of environmental protection management. It should be mentioned that fees charged in Russia for the negative impact relate to non-tax payments, that is, their main role is not to increase budget, but to stimulate environmental activities. Therefore, the present study focuses upon improving the system of environmental charges in order to encourage economic agents to reduce a negative impact on the environment.

2. Brief Literature Review. In most developed countries, the role of environmental payments in the stimulation of rational nature management is very high. Initially, the necessity of their use was justified in 1973 in the 1st EU Environmental Action Program. The studies of O. A. Chizhikova and V. V. Kostogryz (2012) show that due to the transition from administrative to economic mechanisms implemented in the countries of the European Union in the second half of 1980s in the sphere of environmental protection management, a very focused attention was paid to the development of environmental taxes and charges, particularly by the Scandinavian countries [4]. Since the mid-1990s, they have accumulated positive experience that was adopted by the other European states, including the UK, Germany, France, and Italy.

Currently, various forms of environmental charges and taxes are used by all the countries-members of the European Union. Based on the works of K. Kosonen and G. Nicodeme (2009), we can conclude that the most widespread are the energy taxes on some fuels and transport taxes that are levied depending on the type of vehicle [5]. The primary purpose of these taxes is to reduce emissions of pollutants that contribute to climate change. That is also illustrated and analyzed in detail in the works of P. Eldh (2003) where the author considers a tax on energy resources levied in the Netherlands in relation to gas, oil products and coal at the rates being established depending on the magnitude of air pollution from using a particular energy resource [6]. As it was noted by Ukrainian scientists I. A. Brizhan and O. V. Grigoryeva (2015), T. V. Bondar (2015) and others, Ukraine also has the elements of environmental taxation, for example, increased rates of excise duties on diesel fuel depending on the content of sulphur in it [7-8].

The United States of America pay considerable attention to taxes stimulating environmental management. In the tax system of the USA, they refer to local taxes. New York State levies the tax on liquidation of oil spills from the surface of sea areas. A special tax is imposed on enterprises the economic activities of which form the so-called «hazard waste». In addition, as J. Boyd (2001) notes, there is one more widespread tax being imposed on producers that do not recycle the packaging of their products after use [9].

3. Purpose. In order to more effectively stimulate environmentally rational behaviour of economic entities, it is necessary to develop science-based approaches to increasing charges for negative impact on the environment with the subsequent intended use of collected funds.

4. Results. Let us consider which elements make up the stimulation of economic entities if there is a charge for negative impact on the environment in Russia.

Firstly, charges for environmental pollution that does not exceed the established maximum permissible norms for an economic entity are calculated by multiplying the respective charge rate by the amount of pollution, and charges for excessive pollution are calculated by additional multiplying by fivefold increasing coefficient.

Secondly, for regions and river basins appropriate authorities set multiplying coefficients which take into account environmental factors.

Thirdly, charges for pollution within the established standards (limits) are made at the expense of the cost price of production (works, services), and charge for excess pollution (above-limit waste disposal) at the expense of the profits of an enterprise.

Currently, charges for negative impact on the environment are budget revenue generating ones, while under the conditions of budgets deficiency, the funds are primarily allocated on the fulfilment of social obligations, and environmental activities are financed residually. Only 0.8% of GDP is spent on environmental protection in the Russian Federation [10]. Thus, now, charges for negative impact on the environment are more fiscal in nature than stimulatory, and therefore, the basic principle of economic regulation of nature management is violated.

In Russia, the system of regulation of negative impact on the environment is based on the valuation of pollution on the basis of hygienic standards: maximum permissible concentrations, emissions, and discharges. Under the conditions when the main priority is economic growth, Institute of valuation on the basis of maximum permissible concentrations, emissions, and discharges is a very weak instrument for regulating the level of pollution and incentives for its reduction. In the capacity of manmade load indicator from industrial activities, the authors' proposed fines system uses the magnitude of risk to the health of population being located within the impact area [11]. And, as it follows from the works of many foreign researchers, namely, S. M. Bartell (1996), J. Spickett, D. Katscherian and Y. M. Goh (2012), and Peng Kang (2010), the system of environmental regulation based on the assessment of risk to human health from the negative impact of environmental factors and the results of anthropogenic activities has been receiving more recognition and proliferation in the world [12-14].

Fine sanctions are applied in case of exceeding the amount of risk of the acceptable level (>1). In case of negative impact within the sanitary protection zone the amount of fines is calculated on the basis of the enterprises' profits. In case of negative impact outside the sanitary protection zone, fines are based on the enterprises' revenue. The authors developed a classification of objects of negative impact that consists of five categories depending on the social characteristic of areas (Table 1).

Tab. 1: **Ranking of objects of negative impact within the sanitary protection zone**

Objects of negative impact	Rank of social characteristic of the area
Places of long-stay for population (housing construction, social infrastructure), natural areas under special protection	5
Industrial enterprises, organizations, institutions	4
Places of mass gathering of people (shopping centres, stadiums)	3
Places of seasonal stay for population (summer cottages, garage cooperatives)	2
Uninhabited, unoccupied areas	1

Source: Authors' elaboration

The amount of fines is calculated as follows:

a) assessment with taking into account the factor of carcinogenic hazards:

$$P = \sum_{i=1}^{5} \frac{n_i}{N} \times (CR \cdot N \cdot S \cdot Ri)\%\,, \quad (1)$$

where P is the amount of fine, in rub;

N - the number of people affected by anthropogenic impact;

n_i - the number of people located at the place of manmade impact of category *i*;

(CR·N·S·Ri)% - calculated percentage of profit (revenue) share;

CR - the total value of individual carcinogenic hazard,

S - the area of risk zone, km^2;

Ri - rank of social characteristic of the area.

b) assessment with taking into account the factor of non-carcinogenic hazards:

$$P = \sum_{i=1}^{5} \frac{n_i}{N} \times (HI \cdot N \cdot S \cdot Ri)\%, \quad (2)$$

where P is the amount of fine, in rub;

N - the number of people affected by anthropogenic impact;

n_i - the number of people located at the place of manmade impact of category *i*;

(CR·N·S·Ri)% - calculated percentage of profit (revenue) share;

HI - the total value of non-carcinogenic hazard index;

S - the area of risk zone, km^2;

Ri - the rank of the social characteristic of the territory.

Experimental verification of the authors' developed method of calculation of fine sanctions that was performed in the work [15] on the example of negative impact on the aerial environment demonstrates the effectiveness of its application in order to enhance the incentive function of economic mechanism of environmental protection. The authors' calculations for the Kursk plant «Accumulator» as a typical economic agent showed the following: since 2011, charges for the negative impact on the environment according to the current method of calculation has been about 900 USD (at the rate on 20.04.2016), and they perform minimum incentive function. In the case of imposing fines sanctions taking into account the present level of negative impact, the amount of fines will make 91,500 USD. However, if to implement the enterprise's plan of perspective development till 2017 that includes modernization of technological processes and reduction of manmade load on the environment and population health, charges for negative impact on the environment and fine sanctions will have been be significantly reduced and total 915 USD. Thus, the company is economically interested in reducing the negative impact that proves the effectiveness of economic mechanism to stimulate environmentally sound behaviour.

Another effective tool enabling the incentive function of economic mechanism of environmental protection may be the use of tax benefits. However, according to many researchers who analyzed the possibility of applying these measures (P. A. Kiriyenko, O. V. Baturina and A. S. Golovan, 2014), legal groundwork and mechanism for the implementation of preferential taxation in Russia is fragmentarily developed, and few tax benefits that exist now in the Tax Code do not create conditions for manmade load on the environment reducing [16].

In the capacity of an additional economic incentive of environmental protection, the authors propose to introduce tax benefits in the scheme of preferential taxation. That will allow economic agents to reduce taxable profit. If technological processes are modernized, negative impact on the environment will decrease, and the magnitude of health risk will be within the acceptable limits, it will be possible to accrue one hundred percent bonus depreciation to the cost of modernization, i.e. the cost of modernization will be fully compensated.

5. Conclusions. The authors considered the Russian and foreign experience of economic regulation of negative impact on the environment. Enhancing the incentive function can be achieved through the use of a system of fines directed to the environmental sphere and calculated depending on the severity of anthropogenic load on the environment and human health. As an indicator of negative impact of economic activities, it is proposed to use the magnitude of risk to the health of population within the impact area. Experimental verification of the proposed method of calculation of fine sanctions shows the efficiency of its use in order to enhance the incentive function of economic mechanism of environmental protection. In addition to it, based on the analysis of the developed countries' experience, we have revealed the prospects of using tax benefits as a tool for stimulating rational nature management and environmental protection in the Russian Federation.

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