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Экономическая ценность природного капитала и стратегическая экологическая оценка

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Создание эффективной системы управления природоохранной деятельностью, ориентированной на реализацию целей устойчивого развития, предполагает расширение подходов к стратегическому пространственному планированию и стратегической экологической оценке, что требует создания соответствующего информационного обеспечения на основе экосистемного подхода. Это важнейшая и в то же время сложнейшая задача современности, поскольку она касается кризиса измеримости новых трендов развития в условиях ускорившегося технологического перехода и промышленной революции.

Материалы монографии, выводы и комментарии, представленные в ней, показывают возможность и продуктивность применения экосистемного подхода при осуществлении стратегического планирования территориального развития, в процедурах стратегической экологической оценки, в принятии тактических и стратегических решений. Особенно актуален такой подход для территорий, экономика которых в значительной мере определяется добычей природного сырья, где сформировавшиеся сложные антропоприродные системы требуют специального внимания к защите ландшафтов, сохранению и восстановлению экосистем, прежде всего тех из них, которые составляют основу жизнеобеспечения домашних хозяйств. Расширение спектра выявленных и оцененных (в физических и стоимостных параметрах) экосистемных услуг, в первую очередь генерируемых неповрежденными экосистемами, безусловно, повышает осведомленность специалистов, расширяет диапазон выбора сбалансированных решений в сфере землепользования на устойчивой основе, придавая действиям местной власти долгосрочную ориентацию и общественное признание.

Книга представляет интерес для экспертов в области природоохранного управления, экономики природопользования, охраны окружающей среды, для специалистов государственного управления и территориальных органов власти, а также для всех интересующихся вопросами охраны окружающей среды.

Georgy Fomenko, Marina Fomenko, Konstantin Loshadkin
Economic Value of Natural Capital and Strategic Environmental Assessment. A Coal-Mining Region. – Yaroslavl: STC Resources and Consulting, 2018. 150 p.

Scientific editor G. Fomenko

Creation of effective environmental management system, aimed at implementation of sustainable development goals, involves development of approaches to strategic spatial planning and strategic environmental assessment that requires relevant information support based on the ecosystem approach. This is one of the most important and complicated challenges of the modern time as it deals with the problem of measurement of new development models in conditions of accelerated technological transition and industrial revolution.

The materials of the monograph, conclusions and comments show the possibility and effectiveness of the implementation of the ecosystem approach in strategic spatial planning, in procedures for strategic environmental assessment, in making tactical and strategic decisions. This approach is particularly relevant for areas where natural resources extraction determines the economy, where established complex human-nature systems require special attention to the protection of landscapes, conservation and restoration of ecosystems, primarily for those of them that form the basis of households. Expanding the range of identified and evaluated (in physical and monetary terms) ecosystem services, primarily provided by intact ecosystems, increases experts awareness, expands the choice of well-balanced land use decisions on a sustainable basis, supporting long-term orientation of the actions of local authorities and ensuring public recognition.

The book is of particular interest for experts in environmental management, environmental conservation, state and local government representatives as well as for everyone interested in environmental conservation.

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INTRODUCTION

The 5th All-Russian Environmental Congress (Moscow, December 2017) has just come to the end. Broad discussions have showed the complexity of environmental problems and differences in approaches to environmental management. The common concern is the future of the country and the planet. This is no coincidence: the human influence on nature is already comparable with the impact of global geological processes - a human became, in figurative words of Vernadsky¹, «a geological force». The biosphere has turned into an anthroposphere². As a result, as ecologist and writer David Orr notes: «If today is a typical day on planet earth, humans will add 15 million tons of carbon to the atmosphere, destroy 115 square miles of tropical rain forest, create 72 square miles of desert, eliminate between 40–100 species, erode 71 million tons of top soil, add 2,700 tons of CFCs to the stratosphere, and increase the population by 263,000»³. The Report of the Conceptual Working Group on the Millennium Ecosystem Assessment (2005) found that over the past 50 years, humanity has changed ecosystems faster and wider than over any other comparable period of time in the history. This results in a significant, mostly irreversible reduction in biodiversity on our planet.⁴

Successful long-term human development under any technological changes depends entirely on the ability and determination to ensure the sustainability of ecosystems, meaning the ability to maintain structure and normal functioning in changing environment. In fact, the position of human in the biosphere is twofold: on the one hand, human as a biological species is an integral part of the biosphere and, like all organisms, is included in the trophic chains; on the other hand, unlike other living beings, he creates and uses technologies, builds houses and roads, prints books, etc. As a result, we live in a world of growing dynamism and risks, where the notion of sustainability, kept current, is

increasingly regarded as the ability of individuals, communities and geosystems⁵ to survive, adapt and develop in conditions of unexpected stresses and shocks, and even to transform when it is required.

The most socially and environmentally dangerous loss of sustainability is observed in the regions where natural resources extraction is very extensive. The consequence of interference in nature is the change in the human environment, including landscape, land use and water use. This situation results from decades of reductionism and fragmentation, a technocratic, economy-centered approach to the decision-making on resource extraction. Our experience in different regions of the country shows that most of these decisions until recently were made without systematic territory analysis, which involves a joint assessment of the long-term impacts on social and environmental aspects of people's lives in a particular region. This causes significant mistakes, the correction of which, if possible, leads to significant costs. The typical feature of resource-extraction territories is high risks of negative processes, which are often revealed late, when it is already extremely difficult or impossible to improve something. Many cities and towns abandoned in ancient times are sad examples of such a scenario.

It is useful to remember that nature is able to support or, on the contrary, hinder the development of human society. This ability is related to the concept of ecosystem services, which are a set of all the benefits received by human from nature⁶. The wide spread of the concept of ecosystem services, introduced by the Millennium Ecosystem Assessment⁷, has significantly changed the discussions about the loss of biodiversity. The ecosystem approach is now regarded as a basic concept of inclusive green growth and depends on two equally important goals: (1) supporting the structure and functions of ecosystems (the ability of ecosystems

¹ Vernadsky, V.I. (1989). *Biosphere and Noosphere*. Moscow: Nauka.

² The term *anthroposphere*, apparently, was introduced by Dmitry Anuchin in 1902. Anthroposphere is "the stages and forms of culture" of human on the surface of the Earth (cited: Anuchin, D.I. (1954). p. 104. <http://vseprostrany.ru/index.php/2011-12-03-17-28-44/2011-12-28-20-12-58/510-2011-12-28-19-06-55.html>).

³ Orr, David. (1992). *Ecological Literacy*.

⁴ Report of the conceptual working group on the Millennium Ecosystem Assessment, 2005.

⁵ Geosystem is a relatively integral territorial formation, developing in close interconnection and interaction of nature, population and economy, which integrity is determined by direct, inverse and transformed connections between geosystem subsystems.

⁶ Currently, the world is actively working at a wide range of issues related to ecosystem services, including measurement and evaluation of them,

identification of potential sellers and buyers and compensation mechanisms, and the formation of markets for these services. For example, for a long time The Economics of Ecosystems and Biodiversity (TEEB) has been developed by the United Nations Environment Program (UNEP) with the support of the European Commission, the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, UK Department for Environment, Food & Rural Affairs, the Norwegian Ministry of Foreign Affairs, some other national environmental authorities, and other institutions. The World Bank also has a certain interest in this work. In the Russian Federation, the Department of Environmental Economics of the Faculty of Economics of the Moscow State University (Sergei Bobylev), the Institute of Geography of the Russian Academy of Sciences (Arkadiy Tishkov), the Cadaster Institute (Georgy Fomenko) carry out research in this field.

⁷ Millennium Ecosystem Assessment (MA). (2005). *Ecosystems and Human Well-Being*. Synthesis report. Washington, DC: Island Press

to recover) and (2) developing approaches that reduce resource use in production and consumption, as well as to reduce the corresponding impact on the environment (resource efficiency)⁸. In other words, the issue is maintenance of an environmentally appropriate and favorable human habitat in a particular area.

These goals require profound changes in many development institutions, practical approaches, technologies, and even the way of living and thinking. In resource-extraction areas, it is necessary to pay attention not only to local environmental restrictions and regulations, but also to global ones that have been expressed in sustainable development goals (SDGs). The adoption by the UN General Assembly in September 2015 of the global SDGs is aimed to stimulate the formation of new systemic links, focusing on preserving life on earth, that encourage and determine measures to improve the ecosystems sustainability.

The adoption of the SDGs and the orientation toward green growth significantly change the mechanism of strategic planning, focusing on the implementation of a systematic approach and measures to protect, restore and even create ecosystem services (ES). Consequently the requirements for the strategic environmental assessment (SEA) are changing, as it becomes increasingly evident that the quality of life depends on the health of the environment in the broad sense. Thus, the strategic planning for spatial human-nature geosystems should determine environmental restrictions and regulations for the use of ecosystem services, preventing threats to their depletion. It is also important that the strategic planning includes such ecosystem services that can be improved through engineering solutions without negative effect on the sustainability of ecosystems. Thus, developers of strategic planning documents and designers are responsible for making solutions for spatial development that contribute to environmental health.

The strategic planning should increase the number of accountable ecosystem services, especially those that are provided by healthy and undamaged ecosystems. This will motivate to preserve the landscapes and restore those that are damaged or completely lost. Moreover, in the modern world, when the artificial environment (primarily in urbanized areas) is expanding, the ecosystem services typical for such geosystems include water and air purification, climate regulation, carbon capture, waste processing and disposal, detoxification and pest and disease control, etc.

This approach, determining the consequences of changing the environment, allows to record the ecosystem services flows in early stages and improve their efficiency to preserve and increase the natural capital of the territory. It provides an opportunity to obtain additional information on the costs and benefits of changes in the ecosystem services that helps in the environmental management. The inclusion of an ES-compatible language in strategic planning informs decision-makers about the scope and quality of ecosystem services; allows to reconsider the effectiveness of environmental regulation and the investment projects for purposes of sustainable development of the territory.

Nowadays, specialists in strategic planning and strategic environmental assessment should be ready to work and live in a rapidly changing environment, participate in the planning of social development, foresee the consequences of actions taken from the standpoint of the sustainability of ecosystems and social structures. They should not promote solutions that cause environmental degradation or increase the poverty, because such approaches are «unsustainable».

This book considers economic assessments of natural capital, ecosystem services, their integration into the process of strategic environmental assessment (SEA) of the territory social and economic development plan as exemplified by Novokuznetsk Municipal District in the Kemerovo Region. Within the mechanism and procedures of SEA we were to use the ecosystem approach in order to assess the current trends in the territory development, including coal mining prospects, and evaluate the scenarios outlined in the plan. As a result, the proposed measures to adjust the plan received the necessary environmental, social and economic justification. The book, besides the practical part, outlines the theoretical background and methodological principles of ecosystem accounting, as well as specific means of the ecosystem services assessment that result from our more than 20 years of experience in research and practice in this field.

We should note that such extensive economic evaluation of natural capital as a complex of ecosystem and abiotic services of the municipal district was performed in Russia for the first time. The obtained results were considered at the 5th All-Russian Environmental Congress (Moscow, December 2017) at the section «Strategic Approaches to Biodiversity Conservation in the Implementation of Large Infrastructure Projects» and were highly appreciated by both experts and practitioners.

⁸ The report "Europe's Environment: State and Prospects" (EEA, 2010)
URL: http://www.eea.europa.eu/soer/synthesis/okruzhayushhtaya-sreda-evrop44b-sostoyanie-i/at_download/file

This book is of particular interest to specialists in the field of strategic planning, working planners, students and graduate students, as well as everyone interested in the sustainable development and environmental management.

We are much indebted to InEcA-consulting, LLC and the project "Mainstreaming Biodiversity Conservation into Russia's Energy Sector Policies and Operations" of the Ministry of Natural Resources and Environment of the Russian Federation, UNDP and GEF, which made it possible to carry out the researches outlined in this book.

Our research received invaluable information and organizational support from the administration of the Novokuznetsk Municipal District of the Kemerovo Region and the administration of rural settlements of the Novokuznetsk Municipal District, which provided (along with statistical and departmental data) the collection of important indicators of the natural resource aspects of the economy of rural households. They also gave us significant advisory assistance in clarifying and interpreting the obtained results; and questions and comments of local government experts helped to increase the practical value of the results. Siberian Institute of Management Technologies (Mezhdurechensk) provided the collection of quantitative data on the resource use of rural households.

Our research could not have been prepared without active and concerned attitude of Elena Perfilieva, who triggered the implementation of the economic evaluation of ecosystem services in the framework of strategic environmental assessment. Substantial support of the work was also provided by PhD Svetlana Sheinfeld, PhD Igor Kostin, PhD Alexei Vladimirov. Evgeniy Perfiliev, Svetlana Belozerova, KseniaStepanenko and other employees of InEcA-consulting, LLC gave us invaluable assistance in collecting data on natural resources reserves and use, market prices for those resources, distribution of coal production sites in the territory of Novokuznetsk Municipal District (without which our studies would not be so exhaustive and we couldn't develop assessment indicators). Useful advice on the biological value of ecosystems in the territory of the Novokuznetsk Municipal District was given by PhD Alexei Klimov. Statistical data processing was assisted by PhD Alexei Borodkin.

In the course of the research we felt constant support from the side of the Doctor of Science Sergei Bobylev, Doctor of Science ArkadiyTishkov, PhD RenatPerelet. And we are certainly very grateful to our wonderful colleagues - to everyone who supported us in implementation and analyse of the project - Elena Arabova, PhD Anastasia Mikhailova, Svetlana Afanasyeva, Eduard Goge, Anna Luzanova, Ekaterina Migurskaya, Lubov Zemskova.

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CONCLUSION

Summarizing, we can say that the creation of an effective environmental management system aimed at the implementation of sustainable development goals (SDGs) involves development of approaches to strategic spatial planning and strategic environmental assessment, which requires the creation of appropriate information support based on the ecosystem approach. This is one of the most important and complicated challenges of the modern time as it deals with the problem of measurement of new development models in conditions of accelerated technological transition and industrial revolution. The existing statistics and department information systems, in fact, measure the development trends of the outgoing period, lagging behind the new growth trends.

In the course of research in the Novokuznetsk District of the Kemerovo Region, we were convinced of the need for assessing possible scenarios for the economic development (from the perspective of sustainable development), identifying those that are dangerous for human well-being and ecosystems. The conducted researches suggest a number of conclusions concerning methodology and practice, and also result in some practical recommendations.

A. The adaptation of the System of Environmental-Economic Accounting (SEEA), which is a multi-purpose conceptual framework for understanding the interaction between the economy and the environment, to the conditions of Russia; recording and changing of the natural reserves are useful analytical tools for making reasonable strategic decisions and tactical actions in the sphere of territorial development and sustainable environmental management.⁴¹ The information basis broadened by these means (primarily due to the evaluation of natural capital, its structure, dynamics of changes, rental flows, etc.) provides important information for making decisions on social and economic development plans, taking into account the environmental factor. This gives an opportunity to assess the effectiveness of investment projects in the sphere of environmental management in early stages, not only considering business interests, but also the long-term prospects of territory sus-

tainable development, and to determine the most efficient investment directions.

SEEA helps to identify areas that are subject to natural resources depletion with negative social effects (mineral, energy, uncultivated biological resources – fishing and hunting, forest, water resources) due to their intensive and uncontrolled use. It is aimed to reduce or compensate the negative consequences of depletion such as increasing social conflicts, unemployment, environmental problems, etc. The importance of this issue is underlined in the WTO rules: under the Article XX (g), GATT does not prevent its participants from taking [regulating] measures related to «the prevention of the natural resources depletion».

The results of natural capital assessments increase the role and importance of land use zoning, making it more fractional, and take into account many previously unconsidered objective and subjective factors. Such zoning is based on the statement that each natural object creates flows of goods and ecosystem services that determine its value, including economic; and the value of ecosystem services can be estimated not only in physical, but also in monetary terms.

B. The implementation of the SEEA allows to create information support for the solution of a number of important tasks in the management of territories, corresponding to the SDGs, including:

- analysis of monetary flows: «environment - economy - environment», and assessment of the level and rate of resource depletion at the current level of extraction;
- impact assessment of use (including pollution) of natural resources, as well as ongoing environmental measures, on the final value of their reserves, which increases the effectiveness of environmental regulation;
- determining the role of natural assets in creating and directing the monetary flows of the region's economy, which facilitates the search and justification of possible sources of financing for environmental measures.

The use of the UN methodology for environmental and economic accounting, which involves a deep complex analysis of the state and development of ecosystems in the territory and the ecosys-

⁴¹In general, by now more than 150 countries are engaged in improving the systems of accounting and valuation of natural assets; many of them already have elaborated environmental and economic accounting programs, e.g. Australia, Canada, China, Colombia, Italy, Mexico, Norway, the Philippines, South Africa, Sweden. There are a number of international

organizations related to environmental and economic accounting - WAVES (Welfare Accounting and Valuation of Ecosystem Services, World Bank); The green growth strategy (OECD); The Green Economy Initiative (UNEP); The EU Strategy on Environmental Accounting (European Commission) <http://unstats.un.org/unsd/envaccounting/seea.asp>

tem services that they provide, allowed the authors to develop methodological recommendations for the economic evaluation of ecosystem services in the coal mining regions (as exemplified by the Novokuznetsk Municipal District). The outlined evaluation methods (as well as the specific features of the evaluation procedures), adjusted to the conditions of a particular area, ensure analyzing the greatest possible amount of ecosystems and provided ecosystem services which leads to expanding the estimates, the possibilities for their interpretation and obtaining reasonable (considering the environmental and socio-economic factors) and practice-oriented conclusions and comments.

C. The implementation of environmental-economic and ecosystem accounting requires different from the traditional approach to the initial data on the environment and natural resources of the territory – in terms of a set of characteristics and relevant indicators, data collection and analysis, requirements to spatial visualization. Primarily, the scope of the objects and phenomena under consideration is expanding, which, in addition to the traditional analysis of the types of natural resources, involves a detailed and comprehensive study of the character and amount of the provided ecosystem services. The data collection and analysis following the pattern «natural resource reserve – the use of the natural reserve», with the identification and assessment (of characteristics and amount) of the distribution of income flows from the use of natural assets among different users (stakeholders), expands the data collection and analysis to the pattern «ecosystem – ecosystem service» with the identification and economic evaluation of the natural capital of the territory considering ecosystem types and provided ecosystem services, as well as abiotic services of the area.

For the purposes of involving the greater scope of questions in the methodology of the system of environmental and economic accounting, it is possible to use expert assessments and data on specific features, along with results of statistical surveys and departmental accounting. Specific requirements are imposed on spatial visualization of the initial data and evaluation results, due to the territory specific features of information about the ecosystems and the ecosystem services provided. And, most important is to collect data in both physical and monetary terms. Such a change in approaches significantly expands the information and analytical base for strategic planning of territory development and daily management, drawing new (different) data into the consideration of experts and decision makers, allowing to trace the relationships between environmental conditions, socio-economic development characteristics and financial indicators of coal mining regions.

D. Practice-relating, the estimates obtained using the methodology of environmental-economic

accounting provide important information on the role of the natural capital in the economic and social territory development. Comparison of economic and natural resource characteristics allows to assess the change in value of the natural capital (as a complex of ecosystem services) of coal mining regions when remaining the current level of coal mining and when developing different forecast scenarios, and it also allows to carry out retrospective analysis. Thus, we revealed that the ecosystem areas in the Novokuznetsk Municipal District are much more valuable as sources of ecosystem services than as sources of coal – in the total economic value of natural capital, the share of the first was 94% (212494.9 million rub./year), while the value of the coal was 6% (14,225.3 million rub./year). The researches allowed to assess the extent to which the value of ecosystem services decreases when specific areas are used for mining, which showed the efficiency of coal mining concerning long-term sustainability and resiliency of the region. Comparative indicators of the economic value of specific areas, as ecosystems with a set of provided ecosystem services, allow to make reasonable decisions on renting/selling, and pay more attention to the fulfillment of resource users' obligations for reclamation of land after extraction. It's obvious that even unoccupied, empty areas are valuable from the ecosystem point of view. However, the most valuable ecosystems are forests (80% of the total value of ecosystems) and floodplains (11% of the total value of ecosystems).

E. The strategically significant result of the evaluation was the acquisition of economic indicators of provisioning biodiversity-related ecosystem services for the coal-mining region. The significant physical and cost values of used by households and unoccupied farmland, non-timber forest resources, fishery and hunting resources revealed the true significance of forest, agricultural, floodplain and meadow ecosystems, recreational facilities. These types of ecosystems have a sufficiently high potential for increasing the resilience of the rural population, development of small business, providing additional employment and income to the budget in conditions of unstable functioning of the coal industry.

Along with convincing arguments for the high potential of the estimates, we came to an important conclusion that the procedure for assessing the natural capital of the territory itself is an effective tool for strategic analysis and forecasting. At each stage of this procedure, according to the goals, information needs and analytical tools, the conclusions and comments are often crucial to making reasonable decisions on territory management and strategic planning.

F. In relation to the coal mining region, the results of the assessment of natural capital allowed to develop strategic recommendations for adjusting the territory development policy in order to increase

long-term resilience, including: setting priorities for land use and infrastructure development; expansion of special protection of landscapes with common access; investment in the prevention of ecosystem degradation; control of pollution and environmental risks management; municipal zoning; evaluation of the effectiveness of the region development concerning sustainable development; including an ecosystem approach into the territory management in the district; distribution of costs for maintaining of ecosystems among their users; assessment of damage to the region's natural capital. We developed a set of measures to increase the resource use efficiency for the implementation in the current management of local forests (wood and non-timber products), hunting and fishing resources, agricultural land products, water in communal water supply, and coal reserves. Besides, special recommendations are devoted to the process of organization of ecosystem accounting and assessment of the region's natural capital. They include a list of indicators of sustainable development of the area, including indicators of the economic value of ecosystem services, for the purposes of the strategic planning and daily management. Finally, we

prepared a list of actions of the district administration for improving the natural resource management with the aim of increasing (or at least preserving) the economic value and socio-environmental significance of natural capital.

Thus, the conclusions and comments resulted from the conducted researches confirm the possibility and obvious effectiveness of the application of the ecosystem approach in the strategic planning of territory development, in SEA, in making strategic and tactical decisions. This approach is especially relevant for territories which economy largely depends on the extraction of natural resources, where established complex human-nature systems require special attention to the protection of landscapes, conservation and restoration of ecosystems, especially those that form the basis of households. Expanding the range of identified and evaluated (in physical and monetary terms) ecosystem services, primarily provided by intact ecosystems, increases experts awareness, expands the choice of well-balanced land use decisions on a sustainable basis, supporting long-term orientation of the actions of local authorities and ensuring public recognition.