

Expert opinion

Identification and Assessment of Ecosystem Services: the International Context¹

S. Bobylev, A. Goryacheva

Sergey Bobylev – PhD, Professor, Honoured Scientist of Russian Federation; Head of Environmental Economics Department, Faculty of Economics, Lomonosov Moscow State University, MSU, Faculty of Economics; 1–46 Leninskiye Gory GSP-1, Moscow, 119991, Russian Federation; E-mail: snbobylev@yandex.ru

Anastasiya Goryacheva – Post-graduate student, Department of Environmental Economics, Faculty of Economics, Lomonosov Moscow State University; MSU, Faculty of Economics; 1–46 Leninskiye Gory GSP-1, Moscow, 119991, Russian Federation; E-mail: goryacheva.anastasiya@gmail.com

Abstract

Over the past 10 years the problems related to ecosystem services have been reflected not only in scientific developments but also in official conceptual documents of the leading international organizations, including the United Nations (UN), the World Bank, the Organisation for Economic Co-operation and Development (OECD) and the European Community (EC). Ecosystem services and payments for these services have become important in the economic and political parts of these documents. This is related in many ways to the awareness of the rapid degradation of nature, which also damages human well-being and the economy. This article analyzes the existing definitions and classifications of ecosystem services by international organizations and in the scientific literature. It concludes that the term “ecosystem services” remains controversial and that there are a number of approaches to its definition. Common in these approaches is an attempt to link eco-services with benefits for human well-being. The most recognized approach is the methodology of the UN Millennium Ecosystem Assessment, which defines ecosystem services as those benefits that people receive from ecosystems. Particular attention in this article is paid to identifying the economic value of ecosystems and their services, which is the most difficult and urgent task for economic science. Due to the latent nature of many benefits from ecosystem services and their diffusion among consumers/beneficiaries, they largely serve as public goods and are seen as free. Thus their importance is greatly underestimated, which leads to their degradation. Without a solution to this problem, the transition to a new economy for humanity is impossible. It is necessary to level out the risks of over-exploitation and depletion of ecosystem services, which requires that the environmental factor is adequately taken into account when making economic decisions.

In Russia the economics of ecosystem services has been poorly developed both in economic research and in legal and policy documents. An important step in resolving this problem should be the implementation of the Russian president's Orders to the Government of the Russian Federation (January 2017), which envisage the development of an international environmental agenda for the formation of a system of compensation (payments) for ecosystem services with Russia as an environmental donor. Such a system needs to be formed within the country to support regions with large ecosystem capital.

Key words: ecosystem services; economic assessment of ecosystem services; definition of ecosystem services; classification of ecosystem services; payments for ecosystem services

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Introduction

Over the past 10 years, global ecosystem services issues have developed rapidly. This is reflected not only in scientific developments, but also in the official conceptual documents of leading international organizations. The term “ecosystem services” has become important part of their economic and political documents. “The Future We Want,” published in 2012, is the fundamental conceptual document of the United Nations (UN) [UN, 2012]. It defines the main directions of human development in the 21st century and identifies the green economy as the basis for a transition to sustainable development, an important feature of which is the preservation of ecosystem services. This document was adopted at the global UN conference and approved by all countries of the world, including Russia. The importance of ecosystem services has been integrated into many of the UN Sustainable Development Goals (SDGs) for the period 2016–2030 [UN, 2015], and in particular, in goals 14 (conservation of marine ecosystems) and 15 (conservation of terrestrial ecosystems). These SDGs should be implemented by all countries. Similarly, the OECD’s concept of economic development gives priority to green growth, which involves the preservation of ecosystem services [OECD, 2013]. Among international structures, the World Bank, which actively incorporates the economic valuation of ecosystems and their services into its projects, should be noted. In its documents outlining the main directions of development for Europe to 2050, the European Community (EC) also highlights ecosystems and their services [EEA, 2013]. International business is increasingly including ecoservices in its activities. In particular, this is well illustrated by the example of the World Business Council for Sustainable Development [WBCSD, 2012].

In many ways, such activity by international organizations and scientists is associated with an awareness of the rapid degradation of nature, which leads to enormous damage to the well-being of people and the economy. Human impact on the environment is enormous and a significant part of its resources has already degraded or is on the verge of being unable to recover. The rapid growth of the world’s population and improvement of living standards is accompanied by the active involvement of new ecosystems for industrial and agricultural purposes and for housing needs. The demand for ecosystem resources is increasing – fresh water, food, wood and other resources – and the assimilation potential of ecosystems to neutralize and absorb water and air pollution, waste and greenhouse gases is exhausted. As a result, over the past 50 years, about 60% of the world’s ecosystem services have degraded [UNEP, 2005]. The loss of ecosystems and their services leads to huge economic losses. It is estimated that the cost of global environmental damage is \$7 trillion per year, which is equal to 11% of the world economy [WBCSD, 2011].

In Russia, the economics of ecosystem services is extremely poorly developed both in economic work and in legal and policy documents. Several scientific studies can be noted here, including by one of the authors within the framework of the UN Deve-

lopment Programme (UNDP) project for Russia [Bobylev, Perelet, Solov'eva, 2012]. However in 2017, the term “ecosystem services” (probably unexpectedly enough for the executive) acquired an official context. In his Orders to the Government of the Russian Federation, the president noted the need to “develop an action plan aimed at strengthening Russia’s position in the formation of the international environmental agenda, as well as in discussing issues related to the formation of a compensation system (payments) for ecosystem services, based on understanding Russia’s role as an environmental donor” [President of Russia, 2017]. In this connection, the executive authorities and the scientific community of Russia are faced with quite complex problems of identifying and defining ecosystem services, their valuation, compensation and payments for eco-services, and the international economic and legal mechanisms associated with them. Additional research is needed to substantiate Russia’s role as an environmental donor to the global biosphere and to compensate for its global ecosystem services; this will require stepping up activities in this area and coordinating with international organizations.

This article focuses on the identification of ecosystem services and the important economic aspects of their assessment, and the Russian objectives in the context of these problems. At present, there are a number of studies by international organizations on identification and evaluation issues, as well studies by teams and scientists from individual countries. First, it is necessary to highlight the fundamental contribution of the Millennium Ecosystem Assessment Report, “Ecosystems and Human Well-Being” [UNEP, 2005], carried out under the auspices of the UN, and its subsequent modifications. The Report brought together about 1,300 scientists from many countries.

The Genesis of the Ecosystem Services Concept

Constructive economic research on ecosystem services began in the 1990s; here we can highlight the work of R. de Groot et al [2002], R. Costanza et al [1997] and G. Daily [1997]. In many ways, this approach was associated with an awareness of the need to halt the degradation of nature and thereby contribute to increasing the sustainability of the biosphere, increasing well-being and developing the economy. In a broader context, the concept of “ecosystem services” began to emerge at the end of the 20th century (see for example, E. Gymez-Baggethun et al [2010] and R.B. Norgaard [2010]).

Today, the definition of “ecosystem services” remains controversial, and there are a number of approaches to its definition. The first definitions of eco-services can be found in classic ecological economics. According to R. Costanza [1997], ecosystem services are the benefits that people obtain, directly or indirectly, from ecosystem functions. G. Dailey considers ecosystem services to be the states and processes through which natural ecosystems, as well as creatures that inhabit ecosystems, support and make humanity possible [1997].

Perhaps the common element that defines and connects the vast majority of various definitions is an attempt to link eco-services with the benefits and well-being of

a human. This is a fundamental point, associated with an understanding of the need to move from natural science definitions and approaches to economic developments. As made clear in recent decades, when warnings about the degradation of ecosystems were limited to slogans about the urgency of nature conservation, attempts at legal protection proved ineffective. For international organizations and world science, the need to identify a link between nature conservation and the enormous benefits people enjoy from such conservation has become obvious. This should stimulate ecosystem support, in particular through payment (compensation) mechanisms for ecosystem services.

In the recent work of international organizations and scientific research, the most widely used definition is from the UN report in which ecosystem services is defined in terms of the benefits that people receive from ecosystems [UNEP, 2005]. Similarly, in the report of the European Environment Agency (EEA), “ecosystem services” refers to “the contribution that ecosystems make to human well-being” [2012].

An important scientific issue in identifying eco-services is the separation or integration of ecosystem services and ecosystem goods. For example, in some classifications of forest resources, ecosystem services include both the services themselves (regulating floods, climate, etc.) and the explicit products of forest ecosystems: wood, mushrooms, medicinal plants and others. From the point of view of economic theory, it is necessary to distinguish eco-services and ecosystem goods. However, both in the work of international organizations and of many scholars, an approach has emerged that integrates these concepts. The authors share the approach of E. Barbier, according to whom ecosystem services include not only services, but also goods produced by ecosystems [2011]. Most international organizations follow a similar “integral” approach (the structures of the UN and the EC). For example, according to a study of the international TEEB (The Economics of Ecosystems and Biodiversity) project under the auspices of the UN Environment Programme (UNEP), “ecosystem services are the direct and indirect contribution of ecosystems to human well-being. The concept of “ecosystem goods and services” is the same as ecosystem services” [TEEB, 2017].

An important point to consider about ecosystem services is their relationship with natural capital which implies, in particular, the use of the ecosystem approach [Bobylev, Perelet, Solov'eva, 2012]. Natural capital is considered along with physical (artificial) capital, but in contrast to physical capital, aspects of natural capital – for example, ecosystems – can be restored and can function for a long time with balanced use and respect for the limitations of assimilation potential. Consideration of ecosystem services through the prism of the ecosystem approach has practical applicability in the projects of the World Bank's Environmental Department (see for example, S. Pagiola, C. von Ritter and J. Bishop [2004]). Herein, ecosystems are considered to be a form of natural capital. For example, forests are considered to be a resource in the form of wood and non-wood products, as well as a combination of their services.

Classification of Ecosystem Services

A unified classification of ecosystem services has not yet been developed. Most classifications group ecosystem services by the functions provided, i.e. classification is based on a functional feature. The best-known international classifications are: the UN classification in the Millennium Ecosystem Assessment, the Report of the TEEB International Project, and the European Environment Agency (EEA).

The UN report, in which ecosystem services fall into four categories is widely quoted [UNEP, 2005] and includes the following as ecosystem services: provisioning services such as food, water, wood, various natural materials, genetic resources, natural medicines, etc.; regulating services that affect air quality, climate, water resources, water treatment, waste treatment, disease control, erosion and natural disasters; cultural services, such as spiritual and religious, aesthetic values, recreation and ecotourism; and supporting services such as soil formation, photosynthesis and nutrient cycling.

In addition, other functional classifications have been developed. It is possible to single out the classification of scientists such as G. Daily [1997], C. Wallace [2007] and R. de Groot and colleagues [2002; 2010]. The economist-ecologist G. Daily defined four groups of ecosystem services: production of goods; regeneration processes; saturation of life (life-fulfilling); and preservation of environmental benefits. K. Wallace proposed a classification of ecosystem services in terms of human values (needs). Three categories were distinguished: basic resources (food, drinking water, energy, etc.); favourable environment; and sociocultural needs. R. de Groot and colleagues identified four groups of 23 ecosystem services which largely anticipated the UN classification, but as a separate group. As in the TEEB project, there were suggested functions for habitat formation and maintenance for species and their reproduction (a refugium and nursery function).

There were attempts to create a Russian classification of ecosystem services, as part of the prototype of the national report “Ecosystem Services of Russia: Volume 1 – Services of Terrestrial Ecosystems” produced with the support of the TEEB-Russia project and the participation of one of the authors [Wildlife Conservation Center, 2016]. The classification in this report is based on international classifications and the National Strategy for the Biodiversity Conservation of Russia (2002). Three categories of ecosystem services are identified: production (analogous to providing services of international classifications); environment-forming (in international classifications, their analogue is regulating); and informational and spiritual-aesthetic (cultural services).

Economic Valuation of Ecosystem Services

The condition of ecosystems and their services has a huge impact on human well-being. Currently, ecosystem services largely act as public goods and are seen to be free. But because of the latent nature of many ecosystem services benefits and their diffusion between consumers/beneficiaries, their importance is greatly underestimated. This leads to the degradation of ecosystem services.

In this regard, the most important task for the economy becomes economic identification and monetarization of benefits from eco-services, or – in economic terms – a kind of “internalization of latent positive externalities” (external effects/benefits) from ecosystem services [Bobylev, Porfiriev, 2016]. At the same time, the internalization of damages/costs from the degradation of ecosystems is necessary for the practical implementation of the international legal principle that the “violator/polluter pays.”

The economic valuation of ecosystem services should be the basis of international and national payment mechanisms for ecosystem services and should take into account the potential of environmental donor countries. These tasks are reflected not only in documents of international organizations, but also in the Orders of the President of the Russian Federation for the Russian Government (2017) [President of Russia, 2017]. Russia is the world’s environmental donor, maintaining the stability of the global biosphere. It is possible to assess Russia’s contribution to this sustainability in different ways, but its contribution is not questioned in scientific research. According to some estimates, Russia’s contribution is about 10%, which significantly exceeds the similar figure coming after Brazil, Canada and the U.S. [President of Russia, 2016]. Another approach is based on the assessment of undisturbed territory by economic activity in environmental donor countries. Here Russia also leads with an indicator of 60–65% of the total territory of the country. The country’s eco-donation makes it expedient to develop approaches to the “capitalization” of the contribution of Russian ecosystems based on various payment mechanisms for ecosystem services (climate and carbon regulation, biodiversity conservation, forest ecosystems, etc.). In this direction, it is logical for Russia to uphold the need to include the role of forests in international climate agreements to regulate emissions and absorb greenhouse gases.

A full assessment of ecosystem services is the most complex methodological, methodical and practical tasks for the world. The development of the System of Environmental-Economic Accounting (SEEA), worked out by the UN in partnership with several other international organizations [UN et al, 2014], is focused on solving these tasks. The SEEA should reflect the environmental factor at the national and macro-economic levels.

In many countries, effective payment mechanisms for ecosystem services have already been established. In the EC these mechanisms are most clearly manifested in the agricultural sector, where payments are made to farmers to minimize environmental impact. A flexible and efficient system of financial mechanisms to support ecosystems and biodiversity was created in the U.S. (habitats and species banking). There are already 121 U.S. banks that support ecosystem conservation and biodiversity. These banks use 88 types of loans for rare species and 51 types of loans by habitat; such banks are located in 13 states with a total protected area of 123,000 acres. The concept of payments for ecosystem services at the national level was most consistently implemented in Costa Rica in a large-scale programme with the support of the World Bank and the Global Environment Facility created in 1996 (Pago por Servicios Ambientales). The goal of the programme is to encourage landowners to reduce greenhouse gas emissions, preserve water ecosystems, biodiversity and natural landscapes.

The problem of forming a mechanism of payments (compensation) for ecosystem services is also acute for Russia. Preserving a country's role as a global environmental donor requires preventing ecosystem degradation in many regions. The support of eco-services in the regions of Baikal, Altai, the Far East and many other territories in Russia that are important for the planet implies minimal human impact in ecosystems. Most of these "natural" regions are poor and underdeveloped, forcing local authorities and the population to negatively impact (directly or indirectly) ecosystems to maintain/increase their living standards. In this regard, in our opinion, it is advisable to form financial mechanisms to support the ecosystem services of the regions, environmental sustainable projects in the tourism, agricultural, forestry and other sectors. As a first step, Russia can use the available capabilities of existing financial regional instruments (subventions, subsidies, subsidies, transfers, payments, etc.).

There are many calculations confirming the high economic efficiency of preserving ecosystems and their services. In particular, a successful cost-based study was conducted to evaluate New York's water supply options [Chichilnisky, Heal, 1998]. In 1996, the problem of poor quality of water entering the city arose. Two options for improving the quality of water resources were compared: improving the Catskill watershed ecosystem vs building water filtration facilities. The ecological option was nearly three times less expensive than the human-made alternative. Awareness of the value of the watershed in the provision of quality water determined the decision of the city authorities to invest in the ecosystem around New York and create a fairly complicated and large-scale financial system of payments for ecosystem services and their support.

Several iterations can be distinguished on the basis of global and Russian experience for the economic assessment of ecosystem services and the formation of a compensation/payment mechanism for them in the real economy: identification of the ecosystem service; determination of its economic value; identification of the supplier and owner of the ecosystem service; determination of the beneficiary of the service; and the formation of a payment mechanism (compensation) for eco-services [Bobylev, Perelet, Solov'eva, 2012].

The determination of the economic value of ecosystems and their services is the most difficult and urgent task for economics. The transition to a new economy in keeping with the priorities outlined in the conceptual documents of international organizations is impossible without solving this task. It is necessary to level out the risks of over-exploitation and depletion of eco-services. It is possible if the environmental factor is adequately taken into account when making economic decisions. The first fundamental economic research in the field of identification and economic valuation of ecosystem services was undertaken by R. Constanza and colleagues [1997], who made a global assessment of ecosystem services. It averaged \$33 trillion for all ecosystems while global gross national product was almost half that amount (\$18 trillion a year). In 2014 R. Constanza and colleagues made a new assessment of global ecosystem services [2014]. It has already reached \$125 trillion per year. The losses of eco-services are catastrophic for the world and the economy; they amount to an average of about \$12 trillion per year.

Conclusion

Global and large-scale degradation of ecosystems and their services causes significant damage to human well-being. Currently, international organizations and scientific experts have already amassed considerable experience in the field of identification of ecosystem services and their economic evaluation. This experience is reflected in the conceptual documents of the UN, the World Bank, the OECD, the EC and international businesses which have set long-term goals. This article has analyzed the main constructive approaches to the definition and classification of ecosystem services that contribute to the formation of the basis for their adequate economic evaluation.

Identification of the economic value of ecosystems and their services is the most difficult and urgent task for economics. The completion of this task will increase the sustainability of the world economy and the economies of individual countries on the basis of a comprehensive accounting of economic, social and environmental factors. In particular this approach is reflected in the UN Sustainable Development Goals to 2030. It is necessary to minimize the risks of degradation of ecosystems and their services, which requires adequate consideration of the environmental factor when making economic decisions. The economic valuation of ecosystem services should be the basis of international and national payment mechanisms (compensations) for ecosystem services, taking into account the potential of environmental donor countries.

There are at least three tasks in the field of ecosystem services that Russia faces: economic identification and assessment of the benefits of monetarization from ecosystem services at the global, national and regional levels; “capitalization” of ecosystem contributions based on various payment mechanisms for ecosystem services; and the formation of financial mechanisms to support regions with large ecosystem capital.

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Идентификация и оценка экосистемных услуг: международный контекст¹

С.Н. Бобылев, А.А. Горячева

Бобылев Сергей Николаевич — д.э.н., профессор, заведующий кафедрой экономики природопользования экономического факультета МГУ имени М.В. Ломоносова, заслуженный деятель науки Российской Федерации; Российская Федерация, 119991, Москва, ГСП-1, Ленинские горы, д. 1, стр. 46, 3-й учебный корпус; E-mail: snbobylev@yandex.ru

Горячева Анастасия Александровна — аспирант кафедры экономики природопользования экономического факультета МГУ имени М.В. Ломоносова; Российская Федерация, 119991, Москва, ГСП-1, Ленинские горы, д. 1, стр. 46, 3-й учебный корпус; E-mail: goryacheva.anastasiya@gmail.com

За последние десять лет в мире проблематика экосистемных услуг нашла отражение не только в научных разработках, но и в концептуальных официальных документах ведущих международных организаций: ООН, Всемирного банка, ОЭСР, Европейского сообщества. Термины «экосистемные услуги» и платежи за них стали важными в экономических и политических частях этих документов. Во многом такая активность связана с осознанием быстрой деградации природы, которая наносит огромный ущерб благосостоянию людей и экономике. В статье проанализированы существующие дефиниции и классификации экослуж со стороны международных организаций и в литературе, различные подходы для их оценки. В настоящее время определение термина «экосистемные услуги» остается дискуссионным, имеется ряд подходов к их определению. Общей в этих подходах является попытка связать экослужу с выгодами и благосостоянием человека. Наиболее признана в мире методология Доклада ООН «Оценка экосистем на пороге тысячелетия», в котором под экосистемными услугами понимаются выгоды, получаемые людьми от экосистем. Особое внимание в статье уделено идентификации экономической ценности экосистем и их услуг, что является сложнейшей и актуальнейшей задачей для экономической науки. Сейчас из-за латентного характера многих выгод от экослужу, их диффузии между потребителями/бенефициарами, они в значительной степени выступают как общественные блага, признаются бесплатными. Их важность недооценивается, что приводит к их деградации. Без решения этой задачи невозможен переход к новой экономике для человечества. Необходимо нивелировать риски переэксплуатации и истощения экосистемных услуг, что возможно в случае адекватного учета экологического фактора при принятии экономических решений.

В России экономика экосистемных услуг разработана крайне слабо как в экономических работах, так и в правовых и директивных документах. Важным шагом в решении этой проблемы должно стать выполнение поручений президента правительству Российской Федерации (январь 2017 г.), предусматривающих при разработке международной природоохранной повестки учета формирования системы компенсаций (платежей) за экосистемные услуги для России как экологического донора. Такую систему необходимо сформировать и внутри страны для поддержки регионов с большим экосистемным капиталом.

Ключевые слова: экосистемные услуги; экономическая оценка экосистемных услуг; определение экосистемных услуг; классификация экосистемных услуг; платежи за экосистемные услуги

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Источники

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