Brief concept for responsible government agencies
Ecosystem Services of Russia
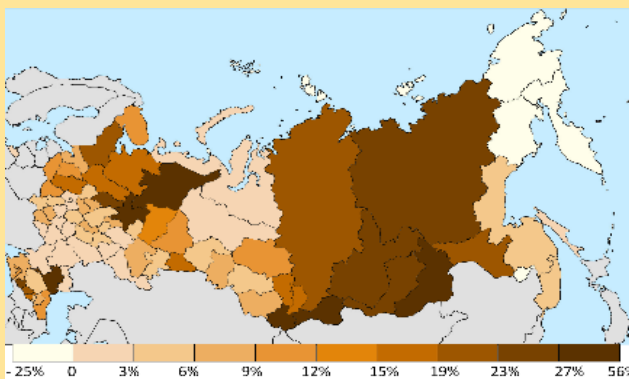## a key component of national well-being

The aim of this document is to offer a short summary of the main results of the TEEB-Russia project for discussing various approaches to accounting for ecosystems and ecosystem services at the national level in Russia.

The project TEEB[1]-Russia (http://teeb.biodiversity.ru/en/) aims to develop approaches to assessing ecosystems and ecosystem services in Russia. The project has been implemented since 2013 by the Biodiversity Conservation Center (Moscow), in cooperation with the Leibniz Institute of Ecological Urban and Regional Development (Dresden). This study was commissioned by the German Federal Agency for Nature Conservation (BfN) with funds from the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU) and is supported by the Ministry of Natural Resources and Environment of the Russian Federation.

Ecosystem services of Russia: why are they important?

🔴 Ecosystem services (ES) are all kinds of benefits that humans receive from living nature – i.e. from ecosystems and species. The concept of ecosystem services helps to optimize nature management, use living nature sustainably and not destroy it. It is approved for implementation in practice in many countries of the world, including the countries of the European Union (1).

🔴 The TEEB-Russia 1 project (2013 – 2015) resulted in the first national physical ES assessment for the constituent entities of the Russian Federation within the boundaries of 2012 where it was carried out (2, 3). In the second phase of the project (TEEB-Russia 2, 2019 - 2019), an economic assessment of ES was made based on the data aforementioned. It has been shown that ES are crucially important for the well-being of the population and the sustainability of the economies of the regions of Russia (4).

– For the Russian population, ES provide favorable environmental and living conditions (clean air and water), amateur fishing and hunting, picking mushrooms, berries and other "gifts of nature" and to determine the aesthetic and spiritual significance of nature.

– For the Russian economy, ES are important to maintain stable environmental conditions necessary for business (water and air purification, regulation of the water cycle, prevention of soil erosion), as well as ecosystem production of key biological resources (wood, fish, and hunting products). The conservation of ecosystems and the maintenance of their sustainable functioning in the regions of Russia significantly reduces the damage to the economy and human health from negative environmental changes, as well as the cost of technological solutions necessary to deal with them.

– The services of Russian ecosystems in the absorption and storage of carbon are important as key global factors in climate regulation.
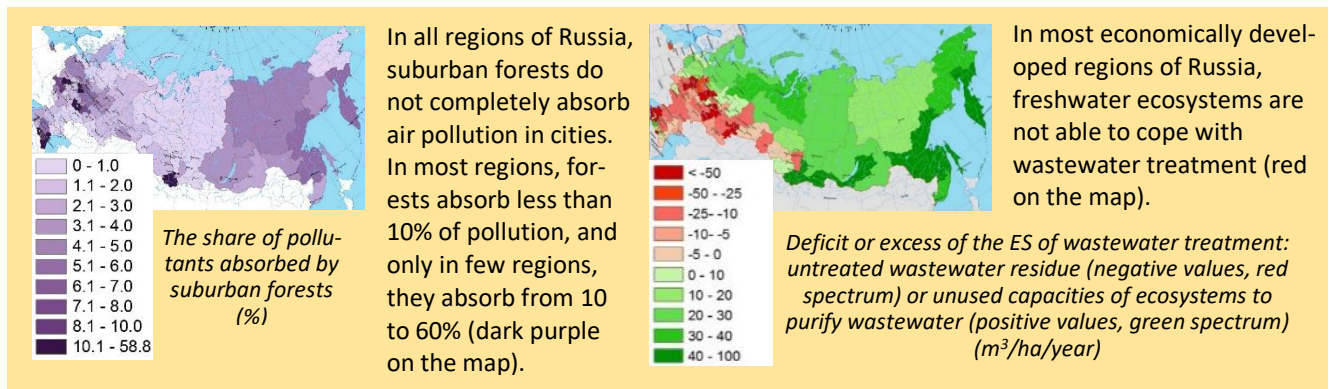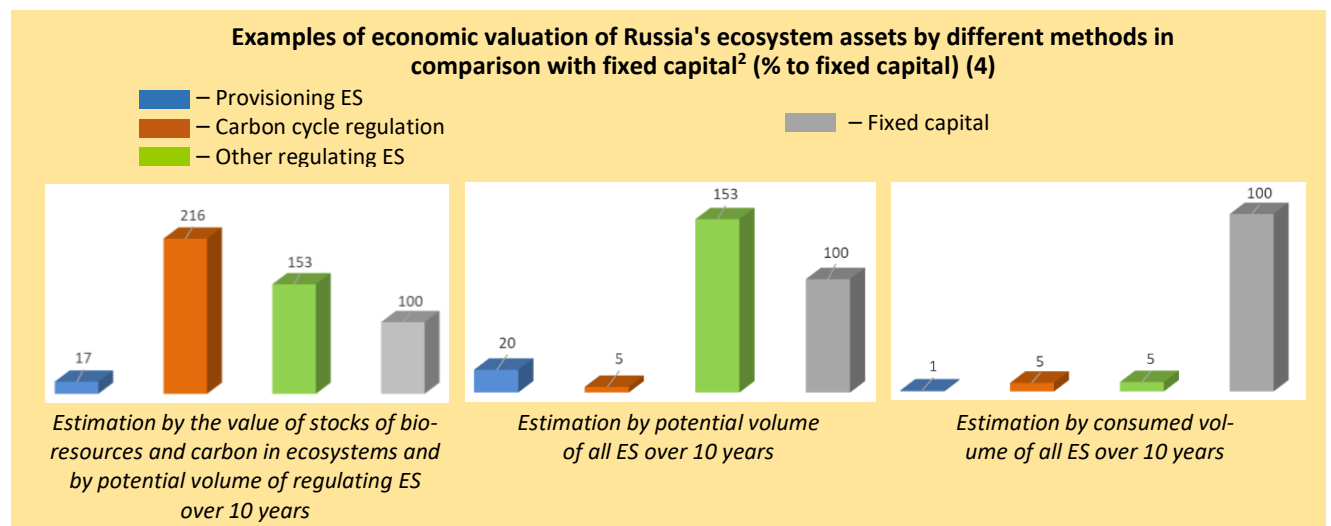
Economic value of ES currently consumed by the population and economy of Russia is several percent compared to the country's gross domestic product (GDP). But in many regions, this cost significantly exceeds 10% of the gross regional product (GRP), which indicates the important contribution of ES to the well-being of these regions and the potential amount of damage in the event of ecosystem degradation there (4).

| -25% | 0 | 3% | 6% | 9% | 12% | 15% | 19% | 23% | 27% | 56% |

Economic value of currently consumed ES compared to GRP (% to GRP)

[1] TEEB – The Economics of Ecosystems and Biodiversity is a global initiative aimed to demonstrate the value of ecosystems and their biodiversity (http://www.teebweb.org/).

– However, several the most important ES in many regions of Russia are already not coping with the task of maintaining an acceptable environmental quality (2).

In all regions of Russia, suburban forests do not completely absorb air pollution in cities. In most regions, forests absorb less than 10% of pollution, and only in few regions, they absorb from 10 to 60% (dark purple on the map).

The share of pollutants absorbed by suburban forests (%)

	0 - 1.0
	1.1 - 2.0
	2.1 - 3.0
	3.1 - 4.0
	4.1 - 5.0
	5.1 - 6.0
	6.1 - 7.0
	7.1 - 8.0
	8.1 - 10.0
	10.1 - 58.8

In most economically developed regions of Russia, freshwater ecosystems are not able to cope with wastewater treatment (red on the map).

Deficit or excess of the ES of wastewater treatment: untreated wastewater residue (negative values, red spectrum) or unused capacities of ecosystems to purify wastewater (positive values, green spectrum) (m³/ha/year)

	< -50
	-50 - -25
	-25- -10
	-10- -5
	-5 - 0
	0 - 10
	10 - 20
	20 - 30
	30 - 40
	40 - 100

🔴 It is necessary to ensure macroeconomic accounting and statistical reflection of ES. Ecosystem assets providing ES should be considered as an important component not only of natural resources, but also of national wealth in general. Ecosystem assets should have appropriate quantitative characteristics determined based on the balance of assets and liabilities within the framework of the system of national accounts (5).

Examples of economic valuation of Russia's ecosystem assets by different methods in comparison with fixed capital[2] (% to fixed capital) (4)

■ – Provisioning ES
■ – Carbon cycle regulation
■ – Other regulating ES
■ – Fixed capital

Estimation by the value of stocks of bioresources and carbon in ecosystems and by potential volume of regulating ES over 10 years

Estimation by potential volume of all ES over 10 years

Estimation by consumed volume of all ES over 10 years

🔴 Adequate assessment, accounting and monitoring of ecosystems, biodiversity and ecosystem services are necessary for effective nature management:

– Russia should be prepared for the recognition of ecosystem accounting in the framework of the system of environmental-economic accounting (SEEA - EEA) as the UN international standard and be ready to begin the implementation of this system given the national specifics of natural conditions and the economy of Russia;

– accounting of ecosystems, biodiversity and ecosystem services is necessary for:
  – environmental impact assessment (EIA) and long-term spatial planning in the regions of Russia;
  – attracting foreign investments in major economic projects in Russia;
  – formation of an optimal policy in relation to protected natural areas - both for the management of existing PAs and for the development of their network;

– ecosystem accounting within the framework of UN standards is required to meet the UN sustainable development goals 15 and 17[3].

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[2] 350 038 577 million rubles at current market value at the end of 2017, according to Rosstat (http://old.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/#).

[3] Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss. Goal 17: Revitalize the global partnership for sustainable development (https://www.un.org/sustainabledevelopment/sustainable-development-goals/).

Ecosystem services of Russia: what to do?

● The results of the TEEB-Russia project provide the main methodological approaches for the experimental ecosystem accounting in the framework of the system of environmental-economic accounting (SEEA-EEA) in Russia at the national level. This methodological basis allows us to begin a phased discussion of this issue by interested governmental departments.

● Macroeconomic and macroecological calculations should be based on the principles of the national accounting system (5) standardized and accepted by most countries, and, first of all, on the international standard "System of Environmental-Economic Accounting – Central Framework (SEEA)" (6) including the supporting recommendations "Experimental Ecosystem Accounting" (SEEA-EEA) (7).

● Ecosystem accounts should include indicators of the status of ecosystems and biodiversity, as well as physical and economic indicators of ecosystem services (4).

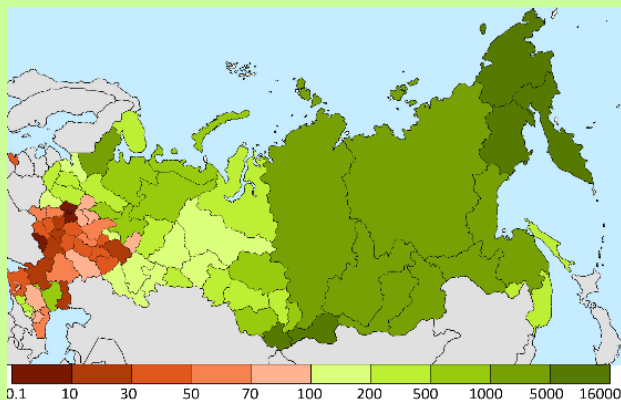**The main groups of SEEA-EEA indicators at the national level**
Indicators of ecosystem assets:
– area of ecosystems;
– indicators of ecosystem functioning - productivity and phytomass of ecosystems;
– indicators of biodiversity - species richness of plants and animals, including assessment of their protective status (inclusion in red lists).
Indicators of ecosystem services:
– ecosystem services provided by ecosystems (potential ecosystem services) for the accounting period;
– ecosystem services needed by the population and economy of the regions of Russia for the accounting period;
– ecosystem services used by the population and economy of the regions of Russia during the accounting period;
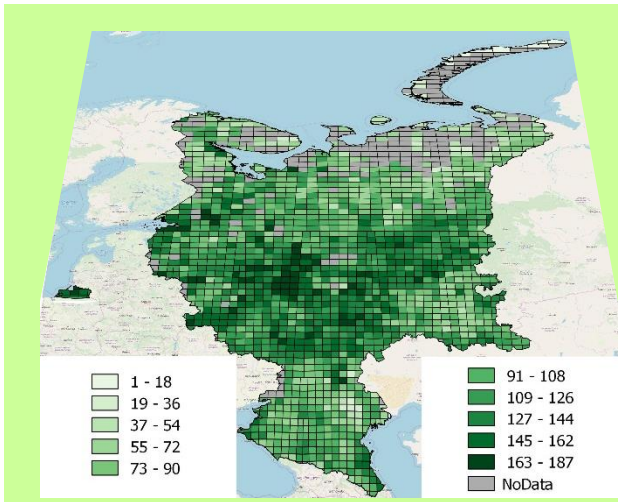– degree of use of ecosystem services and satisfaction of their needs.

● Ecosystem accounting should be regionally differentiated and consider the regional specifics of natural conditions, the degree of anthropogenic transformation of ecosystems and the socio-economic development of regions of Russia. The approaches to the organization of monitoring and assessment of ecosystems and biodiversity, methods of economic valuation of ES and ecosystem assets, as well as interpretation of indicators for decision-making, should be different for the following main groups of regions (4):

– for regions located in different natural conditions – the strongest differences in the relationships between indicators were revealed between the group of northern, forest and mountain ecoregions (Arctic deserts, tundra, northern taiga, southern taiga, mixed forests, mountain forests and tundra of the Urals, mountain forests of the Caucasus) and the group of southern ecoregions (forest-steppe, steppe, semi-desert); in some cases, specific relationships between indicators have been identified for mountainous ecoregions and for forest-steppe;

– for regions that are relatively poorly transformed by humans (northern, forest, mountain ecoregions and semi-deserts) and highly transformed agricultural regions (forest-steppe, steppe).

0.1   10   30   50   70   100   200   500   1000   5000   16000

Economic value of ecosystem assets estimated by the potential volume of all ES for 10 years and expressed as a percentage comparing with the value of regional fixed assets in the economy. Red color – ecosystem asset value is less than fixed assets; green – ecosystem asset value exceeds fixed assets

The approaches to the valuation of ecosystem services and assets and its managerial interpretation should be different in economically developed and highly transformed regions, where ecosystem assets are largely degraded due to human activities, but there is a high demand for ecosystem services, and regions with poorly modified ecosystem assets by people, ecosystem services in which are little used due to low population density.

● Biodiversity, phytomass, and ecosystem productivity are important indicators of the quality of ecosystem assets and the potential for delivering ecosystem services. Biodiversity is a crucial factor in ecosystem functioning and the provisioning of ecosystem services. A decrease in the values of biodiversity indicators, at each point or on average in a region, indicates the degradation of ecosystem assets, which can undermine provisioning ecosystem services (4).

Now, the best coverage of the territory with biodiversity indicators has data on species richness of birds in the European part of Russia, collected within the project of the Zoological Museum of Moscow State University M.V. Lomonosov "Atlas of Breeding Birds of European part of Russia." As the TEEB-Russia 2 project showed, on the base of these data, indicators of the quality of ecosystem assets can be developed for the initial stage of EEA-SEEA in Russia. In future, it is necessary to expand the collection of biodiversity data throughout the country and for as many groups of organisms as possible (plants, insects and other animals).

The number of bird species registered in 50 × 50 km squares within the European part of Russia according to the project "Atlas of breeding birds of European Russia"

● In order to prepare Russia for the approval of ecosystem accounting as the UN international standard, it is necessary to begin a phased, scientifically sound and practically meaningful development of this system based on standardized approaches but taking into account national and regional specifics of environmental conditions and the economy, as well as possible changes in the system of national accounts in Russia.

Main Sources

1. https://www.eea.europa.eu/themes/biodiversity/where-we-stand/ecosystem-services-in-the-eu

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5. System of National Accounts 2008. (2009). New York. (https://unstats.un.org/unsd/nationalaccount/docs/sna2008.pdf).

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7. System of Environmental-Economic Accounting 2012 – Experimental Ecosystem Accounting. (2014). New York: United Nations. 2014. (https://www.oecd.org/env/system-of-environmental-economic-accounting-2012-9789210562850-en.htm).

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