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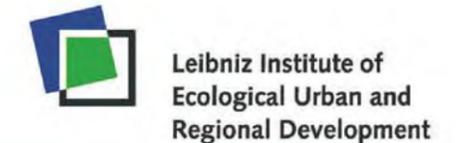
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The Prototype of the National Report (Vol. 1) includes on-line supplement with quantitative ES evaluation spreadsheets and high-resolution maps ([www.biodiversity.ru/teeb-russia.html](http://www.biodiversity.ru/teeb-russia.html)) (available from August 1, 2016).

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TEEB-RUSSIA

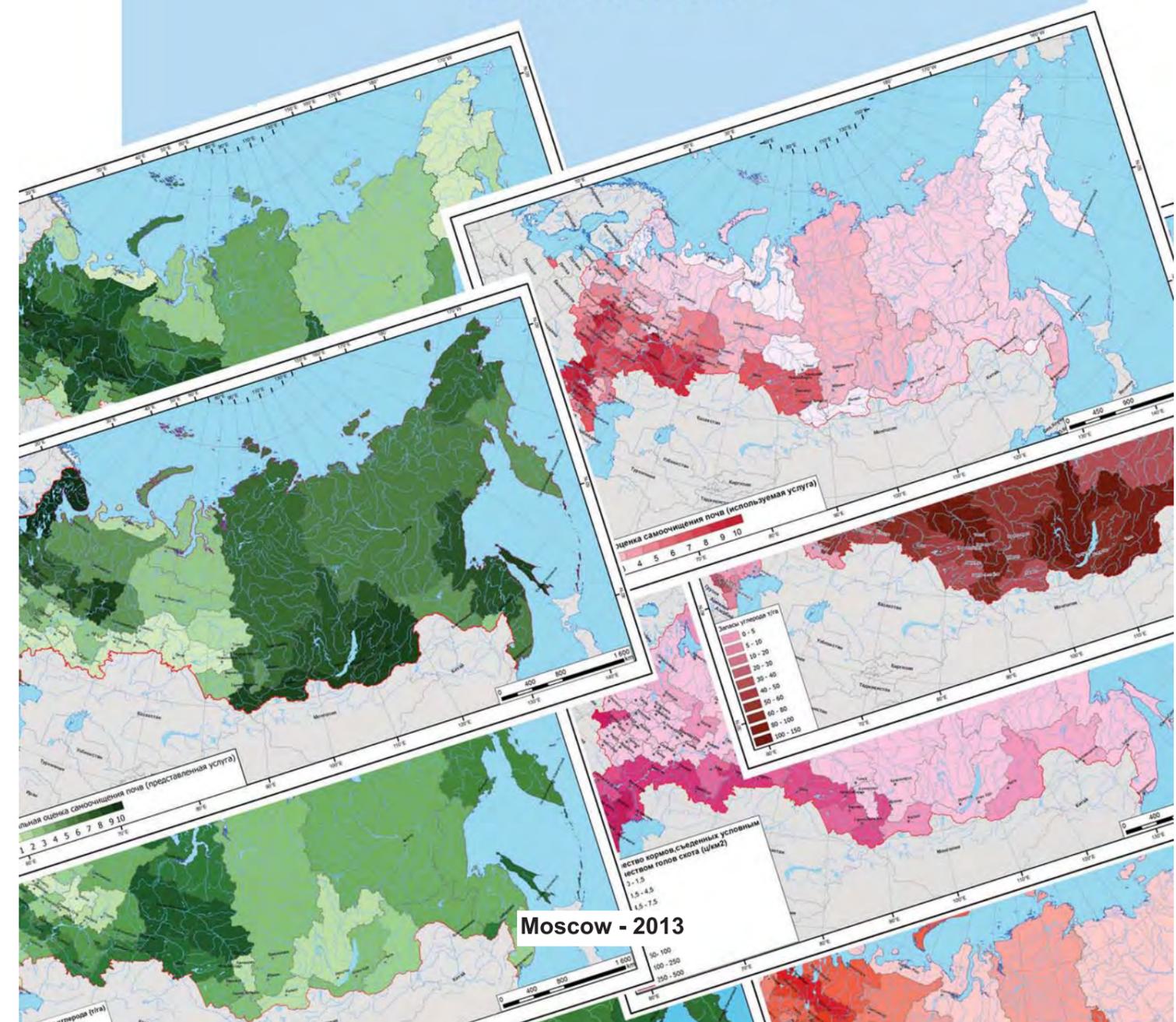


# Ecosystem Services of Russia

Prototype of National Report  
Volume 1

## Services of Terrestrial Ecosystems

Summary  
for decision makers



The Russian-German project "TEEB-Russia. Ecosystem Services Evaluation in Russia: First Steps" was initiated in 2013 by the Biodiversity Conservation Center (Moscow) in cooperation with the Leibniz Institute of Ecological Urban and Regional Development (Dresden) in accordance with the decision (of 23 May 2012) of the

Russian-German standing working group "Protection of nature and biodiversity". The financial support is provided by the German Federal Agency for Nature Conservation (BfN). The project is also supported by the Ministry of Natural Resources and Ecology of the Russian Federation.

**The goal of the project** is the creation of the Prototype of the National Report on Ecosystem Services of Russia, which demonstrates approaches to country-scale ecosystem services (ES) evaluation as well as the urgency to start forming a national system of ES monitoring and evaluation and the integration of ES value into economy and decision-making process.

In the first phase of the project (2013-2015) the Volume 1 of the Prototype Report considering terrestrial ecosystem services was created. It addressed the following main objectives:

- the ES classification adapted to Russian conditions was elaborated;
- the possible approaches to the ES estimation on the federal and interregional levels were demonstrated;
- the most important ES of the Russian regions were evaluated quantitatively in natural sciences indicators or estimated in points;
- the existing publicly available data on ecosystems, their components and their use were analysed, the list of necessary additional data to ES assessing on the national and interregional levels was compiled.

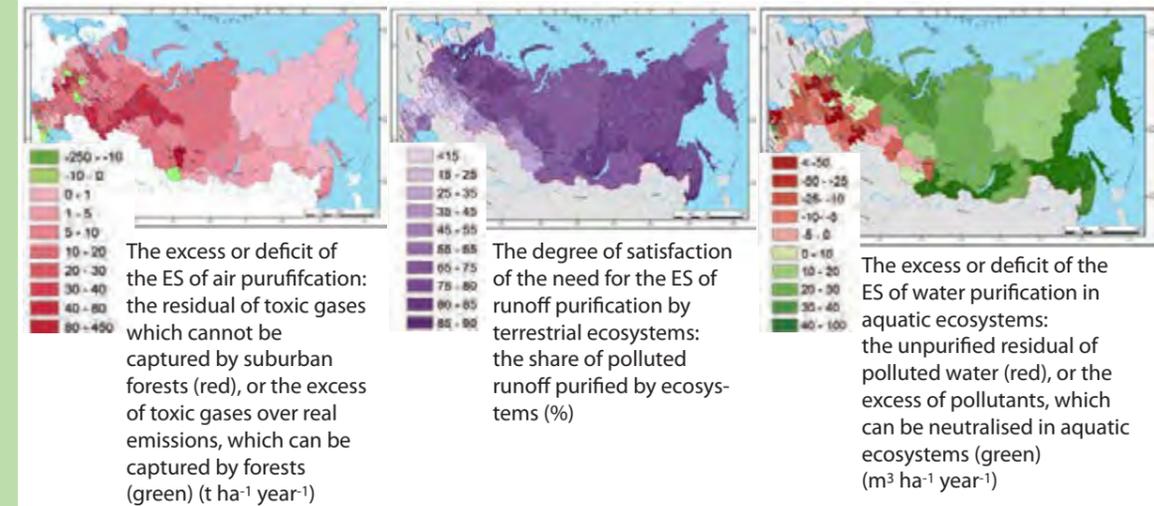
Economic ES valuation, the analysis of the importance of biodiversity for ES maintenance, as well as the development of specific recommendations on monitoring and management of ES of Russia are scheduled for the following stages of the project.

Given the limited resources of the project, the national report prototype can not claim a final comprehensive ES assessment. The document pursues methodological goals and shows possible approaches to the ES estimation on the national level and their importance for the socio-economic development and population welfare of Russia.

**All the ES estimates presented in the Prototype of the National Report are only illustrations of the possible assessment approaches and should be significantly refined for use in decision making.**

## THE MAIN FINDINGS

- **Terrestrial ecosystem services are critical for the well-being of population and economy of Russia.** The provided by ecosystems amount of the most important ES is comparable to the amount of basic needs of population and economy of the Russian regions in regulation of the environment, natural bioproduction, conditions for recreation.
- **A number of the most important life-supporting services are fully used or they already are not sufficient to meet the needs of people and economy.** This is true for ecosystem regulation of runoff, ensuring water quality by terrestrial ecosystems, purification of water in aquatic ecosystems, absorption of air pollutants by suburban forests.



**A number of the most important regulating services already are not sufficient to meet the needs of people and economy**

- **Uneven distribution of supplied, demanded and consumed ES makes some regions ES donors, and others – ES beneficiaries.** These relations must be considered when national and interregional planning and development of ES markets.
- **ES monitoring is absent in Russia.** Monitoring of natural ecosystems (except for forests) and the components of biodiversity which are the physical and functional basis of ES is incomplete and does not correspond to the modern level of technology. Bio-resources accounting systems are permanently reformed and do not provide comprehensive information. The degree of official data reliability is low, especially on IUU harvesting and forest fires. Many of the data are not available in the public domain.
- **Immediate start forming of a national system of ES monitoring and evaluation is necessary, as well as mechanisms of integrating ES values in decision making.** If this is not done the environmental safety and sustainable development of Russia will be threatened, global advantages of ecological donor country will be lost.
- **Currently ES are missing in the field of state regulation.** ES are not adequately assessed and does not take into account when making decisions. **Provisioning ES** partially (the main biological resources) is subject to government regulation, but in the post-Soviet time, it was significantly weakened and the share of illegal unreported and unregulated (IUU) harvesting of all types of bioresources has grown substantially. **Regulating ES** are practically not taken into account and are not regulated by the government, except for some forest ES (partly water and soil protection and "carbon" services). The lack of regulating ES accounting in decision making leads to damage that may exceed several times supposed profit. **Information ES** are completely absent in the governmental and legal regulation. **Recreational ES** are understood very limited - just as the possibility of get profit from recreation in nature. Particularly, this has a negative impact on the strategy of development of Russian nature reserves (zapovedniks). The traditional priority task of preservation and study of nature was replaced by the task of the tourism development which inevitably leads to violations of natural systems and the loss of information about their structure and functions.

## ES CLASSIFICATION

**ES classification.** The Prototype Report employed a classification of ES combining the approaches of the Millennium Ecosystem Assessment, CICES and National Strategy of Biodiversity Conservation in Russia (2001). It includes four major ES groups:

- 1) **productive (provisioning)** – production of biomass which is removed from ecosystems by people (in contrast to CICES, "production" of water is not included);
- 2) **environment-forming (regulating)** – establishment and maintenance of the environmental conditions conducive to human life and economic development;
- 3) **information (cultural)** – all kinds of information which is contained in natural ecosystems and can be used by people.
- 4) **recreational** – establishment and maintenance of natural conditions for different types of recreation; recreational ES are integrative, as they are coupled to all of the groups above to various extents.

This ES classification is proposed to use in the national system of ES monitoring and assessment.

## DATA SOURCES

**Data sources.** ES were assessed by open public data bases of the Russian Federal State Statistics Service (FSSSR), published cartographical materials and statistical compilations. The Prototype Report has primarily a methodological orientation. Analysis of the accuracy of used data and their adjustment is not a task of the Prototype Report. The accuracy of the ES estimates corresponds to the accuracy of the source data. In the future ES valuation should be clarified on the basis of more detailed and adjusted original data.

## METHODS OF ES ASSESSMENT

**Units of assessment.** The subjects of the Russian Federation – Oblasts, Krai, Republics etc. (the top-level administrative units; hereinafter the regions) were used as assessment units. The entire socio-economic data as well as some environmental indicators were obtained from the public FSSSR databases and the databases of other federal agencies, which produce data for the subjects of the Russian Federation. There were multiple sources of physical, geographical and biological data used for ES evaluation, which was available at various scales from the level of medium-resolution satellite imagery to the level of natural domains. To make our assessment uniform, we assumed the values scaled down or up to the level of the administrative units using GIS methods.

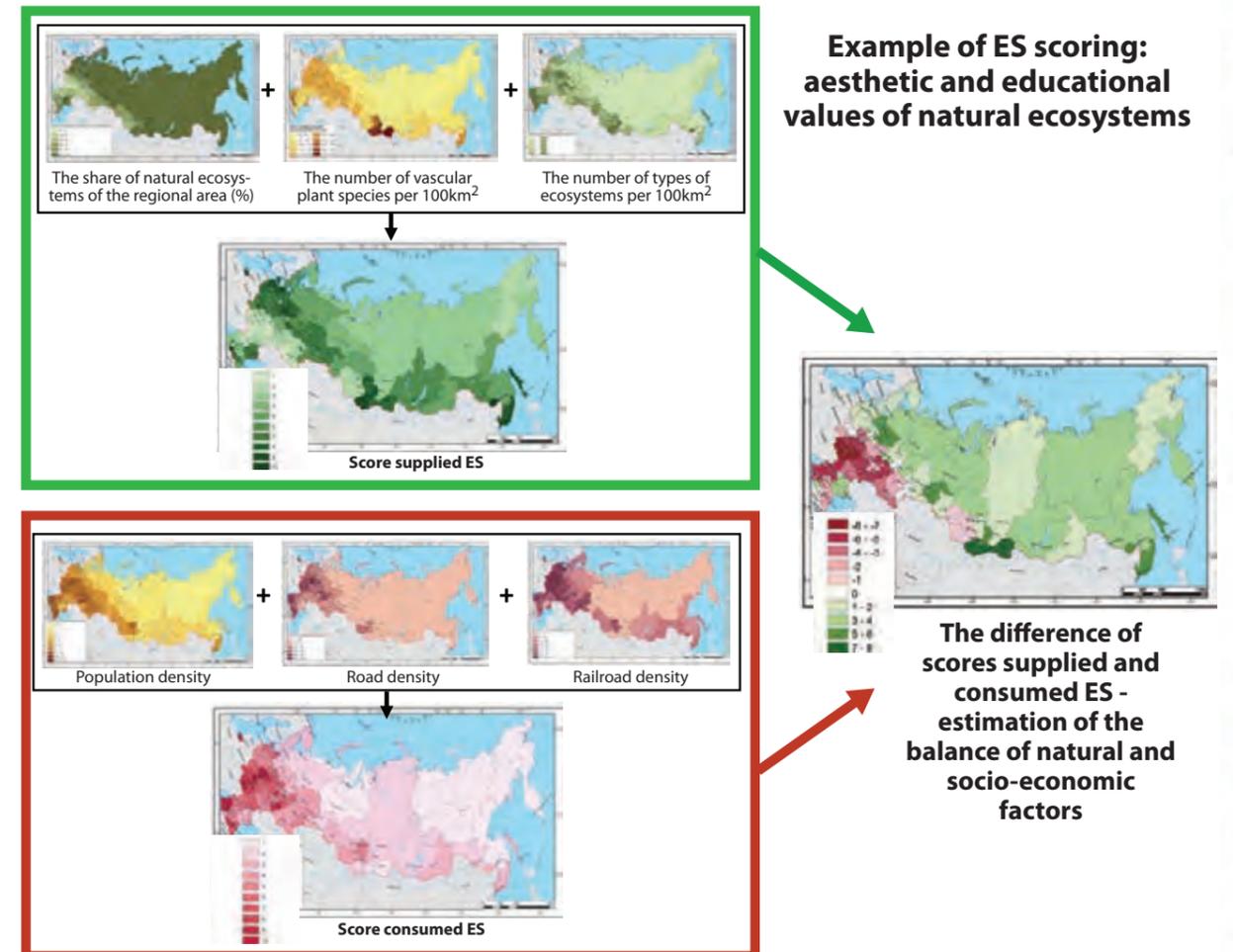
**Methods of ES assessment.** Depending on the data availability and methodological clarity the following methods were used.

1. **Direct quantitative evaluation** when statistical data are available on supplied, demanded and consumed ES.
2. **Indirect quantitative evaluation** based on combination of other quantitative data on regional ecosystems and economy.
3. **Score in points** if there is no data to evaluate ES itself and if it is possible to estimate only factors affecting it. Scores of supplied ES show the relative intensity of natural factors that determine the performance of ES (eg, the share of natural ecosystems of the area of the region). Scores of demanded and consumed ES show the relative intensity of social and economic factors that determine the need for ES and their use (eg, population density and transport accessibility of the territory).
4. **Formulation of the task** of ES assessment, if methodological approaches aren't ready for the above methods or failed to get data.

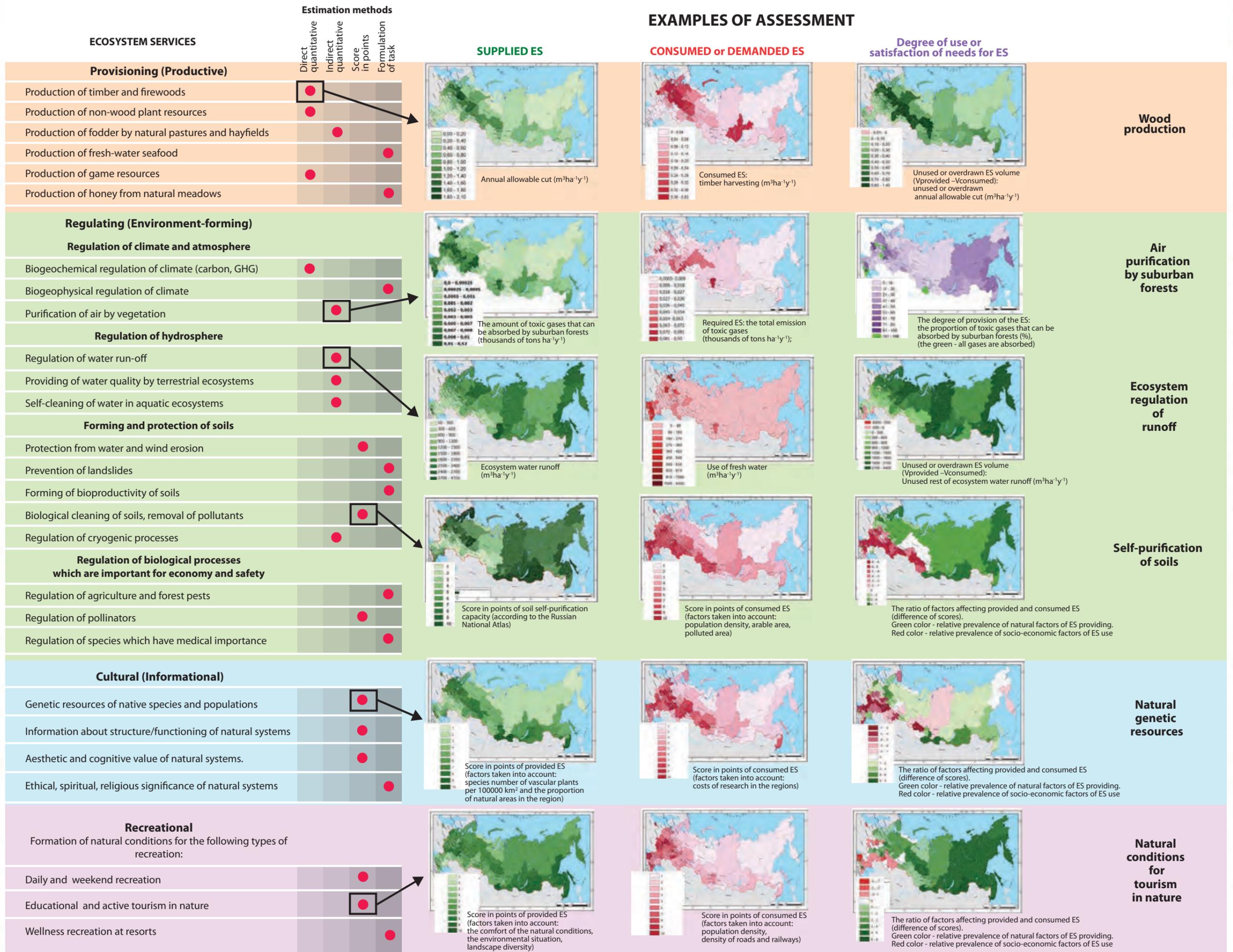
### PRELIMINARY REQUIREMENTS FOR THE NATIONAL SYSTEM OF MONITORING, EVALUATION AND MANAGEMENT OF ECOSYSTEM SERVICES

The system of monitoring, evaluation and management of ES should take into account the state of natural ecosystems and biodiversity, as they are structural and functional basis of ES. These issues will be considered in the Volume 2 of the Prototype Report and the full requirements for the system of monitoring, evaluation and management of ES will be set after that. In the Volume 1 of the Prototype Report only the general preliminary requirements were formulated.

- Considering the current state and possible changes of biodiversity at different hierarchical levels (intra-population, intraspecific, species and ecosystem diversity) as a basis of ecosystem functions and services, because biodiversity is a critical factor in efficiency and stability of ecosystem functioning.
- Valuation of species and populations, including traditionally considered as commercial resources, taking into account their importance for the sustainability of ecosystems and the ES performance.
- Accounting the total value of all major groups of ES, and first of all environment-forming (regulating) ES; priority of environment-forming (regulating) ES in possible conflicts between aims of use of different ES.
- Estimation of ES in three indicators: supplied, demanded and consumed ES.
- Considering spatial scales of ecosystem functions and services.
- Comparing spatial distribution of ES and indicators of socio-economic development of regions in the choice of the assessment methods and management goals.
- Use of best available techniques and technologies.



## EXAMPLES OF ASSESSMENT





## COMPARISON OF THE REGIONS

Scoring supplied and consumed ES gives the possibility to compare the regions of Russia by the ratio of natural factors that determine supplied ES, and socio-economic factors that determine the need for the services and their use

The matrix on this spread shows the difference of scores supplied and consumed ES. Positive values (green) indicate a predominance of natural factors that provide ES, negative (red) - the predominance of socio-economic factors that determine ES use. Zeros and values close to it (white and light colors) indicate the relative balance of natural and socio-economic factors. Values moving away from zero (bright colors), show an imbalance of factors.

Natural factors that determine supplied provisioning ES, notably prevalent in the Ural and Siberian federal districts, as well as in some regions of the North-Western, Volga and Far Eastern federal districts (ie, non-wood products in Komi Rep., Perm region and Sakha Rep.). Socio-economic factors determining the consumed provisioning ES predominate in all districts, except for the Ural, Siberian and Far East. The most intense they are in the South and the North-Caucasian federal districts (use of natural pastures), in some regions of the North-West, Central and Volga federal districts (use of wood products).

Natural factors that determine supplied environment-forming (regulating) ES predominate in the North-West, Siberian and Far Eastern federal districts. Most strongly it appears to ES associated with the runoff regulation and purification of water and soil. On the contrary, the factors ensuring air purification, predominate in the regions with great area of suburban forests (Central, North-Caucasian federal districts and some regions of the North-Western, Volga and Southern federal districts). ES of carbon cycle regulating are provided primarily by wetland ecosystems in Western Siberia (Ural and Siberian federal districts), as well as chernozem (black earth) ecosystems in the southern regions of the Central Federal District.

The consumed "carbon" ES, which are calculated as carbon accounts in managed forests, are represented in all districts, except for the South and the North-Caucasian districts, where are few managed forests. The result is a significant imbalance: in the forest regions of North-West, Central, Volga and Siberian districts factors of ES use are predominate, while the main natural factors of supplied ES are presented in nonforest districts with peat and black soils. Socio-economic factors determining the consumed ES of runoff regulation and purification of water and soils predominate in the Central, Volga, Southern and North Caucasus federal districts.

Natural factors that determine supplied information ES are associated primarily with biodiversity indicators. They are strongest in the North-West, North-Caucasian, Siberian and Far Eastern districts. Factors determining consumed information ES use are the most intense in the regions with high population density and well-developed transport network (Central, Volga, Southern districts).

Natural factors that determine supplied recreational ES relatively prevalent in the North-Western, Volga, Urals, Siberian and Far Eastern districts, while socio-economic factors determining ES use predominate in only a few regions (Kaliningrad, Moscow, Samara, Krasnodar regions).

In general, the comparison of the regions shows the expected pattern: natural factors that provide ES, relatively prevalent in the North-West, Siberian and Far Eastern districts, socio-economic factors determining the use of ES prevalent in the Central, Volga, Southern and North-Caucasian districts. Distribution of provisioning and recreational ES is the most balanced (except for few regions).



	Productive (Provisioning)			Environment-forming (Regulating)							Information (Cultural)		Recreational							
	Production of timber	Non-wood plant production	Production of natural fodder	Production of game resources	Carbon storage	Regulation of CO <sub>2</sub> flows	Purification of air by forests	Regulation of water runoff volume	Regulation of runoff variability	Water cleaning by terrestrial ecosystem	Water cleaning in aquatic ecosystem	Soil protection from water erosion	Soil protection from wind erosion	Self-purification of soils	Pollination	Natural genetic resources	Inf. about structure and functioning	Aesthetic and cognitive value	Daily and weekend recreation	Tourism in nature
<b>North West Federal District</b>																				
Arhangelsk region	4	1	0	0	5	2	1	5	2	5	4	1	1	4	0	2	0	3	2	3
Vologda Region	1	1	0	0	4	1	3	5	0	5	3	0	1	4	0	2	1	5	5	2
Leningrad region	4	0	0	-1	5	4	1	3	-3	-1	0	1	0	2	0	0	3	2	3	1
Kaliningrad region	-1	2	0	0	-1	3	5	3	-4	3	2	2	3	2	1	0	2	1	1	3
Murmansk region	-1	2	0	0	2	1	-1	4	1	5	3	1	1	2	0	3	1	2	1	3
Nenets AO	0	0	1	0	5	2	0	7	1	7	6	0	0	2	0	0	2	3	1	0
Novgorod region	2	4	0	-2	1	3	2	5	0	4	3	0	0	5	1	2	0	2	4	2
Pskov region	-1	3	0	0	2	4	2	4	2	3	4	1	1	3	3	6	4	2	4	3
The Republic of Karelia	3	0	0	1	3	1	1	6	1	7	4	1	1	1	0	3	0	2	0	1
Komi Republic	0	1	0	0	6	3	0	6	1	7	5	1	1	3	0	1	1	3	2	3
<b>Central Federal District</b>																				
Belgorod region	-1	1	0	-3	7	2	-4	-1	-2	5	1	2	5	1	6	3	4	1	0	
Bryansk region	5	3	0	-1	3	-1	5	1	5	-1	2	2	2	0	5	3	3	2	-1	
Vladimir region	6	3	0	-3	5	3	7	2	0	6	5	0	1	4	4	2	1	2	1	0
Voronezh region	-2	-1	0	-3	6	1	1	-1	2	-2	5	2	2	7	0	7	6	7	2	2
Ivanovo region	-2	4	0	-1	5	-3	5	2	-1	-4	-4	2	2	2	5	1	3	1	1	0
Kaluga region	-2	1	0	1	4	-1	7	2	1	-3	4	1	1	2	4	-3	-3	0	2	-1
Kostroma region	0	2	0	1	0	0	1	-2	1	4	2	0	0	4	1	7	6	5	6	4
Kursk region	-1	1	0	-1	6	5	4	-1	-4	-2	-1	0	2	4	3	6	-1	1	1	-1
Lipetsk region	-2	0	0	1	4	5	5	0	-1	5	5	2	2	3	1	1	4	8	1	0
Moscow region	-2	3	0	-3	3	3	0	4	5	4	5	1	1	3	4	-3	4	3	-2	-4
Oryol Region	-1	0	0	-2	3	6	3	1	4	-2	-3	0	1	4	5	1	7	5	2	0
Ryazan Oblast	-3	-3	0	-2	3	3	-1	1	3	7	-3	2	2	5	6	-2	-3	4	1	0
Smolensk region	0	-1	0	-1	-3	-4	1	3	2	-4	-1	1	1	2	4	2	0	0	3	0
Tambov Region	-2	-1	0	1	5	3	0	2	3	-1	-3	3	2	4	0	-4	-3	4	3	3
Tver region	-3	-1	0	-4	6	-4	2	1	0	-2	2	0	0	2	2	1	-4	1	4	1
Tula region	-1	2	0	-3	2	2	-2	-1	1	6	6	0	2	7	5	-3	-3	5	-1	-1
Yaroslavl region	-2	2	0	-1	5	-2	3	3	-3	-3	-2	0	1	2	3	-1	-1	1	3	2
<b>Volga Federal District</b>																				
Kirov region	-3	2	0	0	8	1	2	5	2	2	1	1	1	3	3	3	-1	2	4	3
Nizhny Novgorod Region	-4	0	0	-1	-4	0	1	-1	-2	-1	6	2	2	-2	4	-4	5	2	1	2
Orenburg region	-1	0	1	1	4	0	4	4	-1	-3	0	1	0	4	-1	-1	4	3	0	
Penza region	-2	1	0	-2	2	1	5	0	-2	-1	5	2	3	-2	5	7	5	4	3	1
Perm Krai	0	4	0	0	7	0	0	2	-2	-1	0	1	3	1	0	5	3	4	3	
Republic of Bashkortostan	1	2	-1	1	-1	1	0	3	-3	-3	-4	-2	1	-4	4	-2	4	2	5	-2
Mari El Republic	-4	0	0	1	-4	1	4	2	2	2	2	3	1	2	1	4	6	3	5	-1
The Republic of Mordovia	-2	-1	0	1	0	2	1	2	4	-1	2	2	3	0	7	-2	1	3	3	
Republic of Tatarstan	0	0	0	-1	1	3	0	-1	-3	-3	6	3	3	7	5	-6	-4	5	2	-1
Samara Region	-1	1	1	-2	4	-2	-2	-1	-4	6	1	3	0	0	7	4	6	1	-3	
Saratov region	-1	1	0	0	4	0	0	0	-2	-1	-3	2	0	6	0	-3	-3	5	2	-1
Udmurt Republic	5	1	0	-2	-5	-3	4	2	-2	-1	-3	2	2	2	5	2	3	0	3	1
Ulyanovsk region	-1	-1	0	1	2	-2	4	0	6	-2	6	3	3	-3	3	7	-2	2	4	4
Chuvash Republic	-1	-1	0	2	-1	-2	5	1	-1	-2	0	0	2	4	6	-3	1	4	1	3
<b>South Federal District</b>																				
Astrakhan region	0	0	-5	0	0	2	-2	5	-1	0	4	-2	5	1	2	3	4	3	1	-2
Volgograd region	-1	1	0	-3	2	1	-1	0	-2	0	-4	1	-2	5	1	-3	-2	4	-1	-2
Krasnodar Krai	-1	0	0	-3	1	4	1	6	2	-2	-4	2	2	0	0	-4	1	5	-1	6
Republic of Adygea	0	0	-1	-2	0	0	3	-2	4	-1	0	2	2	0	-3	1	5	2	-1	2
Republic of Kalmykia	-1	0	-5	0	0	4	0	-1	0	0	-2	-5	0	0	0	4	6	4	1	-2
Rostov region	-1	1	-2	-3	3	-1	1	5	-4	-1	-1	2	1	0	2	7	-4	6	1	0
<b>Northern Caucasus FD</b>																				
Republic of Ingushetia	0	0	-1	-2	1	-4	2	-3	5	-1	0	-1	2	-3	4	0	5	2	0	4
Kabardino-Balkar Republic	0	0	-6	-1	2	-2	7	-2	-1	-2	-2	1	-2	2	0	0	3	0	0	1
Karachay-Cherkess Republic	0	0	1	-5	0	5	0	7	0	3	1	4	1	2	2	3	4	4	0	1
Republic of Dagestan	-1	1	6	0	2	6	1	0	4	0	2	3	4	-1	4	4	4	2	1	1
Republic of North Ossetia	0	0	-3	2	1	1	0	-1	3	5	-1	3	1	0	4	0	3	1	1	1
Stavropol region	-1	1	-3	0	3	4	4	0	4	0	5	0	2	5	1	2	3	2	2	-1
Chechen Republic	0	0	-2	1	0	2	6	6	-3	-1	2	4	1	2	4	2	6	2	1	4
<b>Ural Federal District</b>																				
Kurgan region	4	-1	5	0	2	3	2	0	0	-1	2	3	4	5	6	3	3	2	6	2
Sverdlovsk region	2	1	0	1	5	2	0	5	-3	-3	4	1	1	0	1	1	8	1	0	0
Tyumen region	2	0	1	-1	4	0	1	2	-8	1	-2	3	3	3	2	1	3	5	6	2
Khanty-Mansi AO	0	4	0	0	2	-1	5	5	-1	7	5	1	1	0	0	2	2	4	3	4
Chelyabinsk region	1	0	3	5	1	-4	-3	1	5	7	1	1	3	5	-4	2	0	4	-2	
Yamalo-Nenets AO	-1	3	0	0	2	0	-1	5	1	6	1	0	0	3	0	1	0	3	3	1
<b>Siberia Federal District</b>																				
Altai Krai	1	0	1	1	1	-1	1	3	1	-1	2	1	2	4	6	0	2	1	4	1
Transbaikal Krai	0	3	1	2	5	3	1	3	1	2	6	0	1	5	1	6	1	2	5	7
Irkutsk region	-4	5	0	1	1	-1	2	5	0	4	3	1	1	3	0	2	-3	4	4	5
Kemerovo region	1	0	2	0	4	7	3	3	-4	0	1	2	1	0	3	1	2	2	2	2
Krasnoyarsk Krai	-1	4	0	0	-2	1	0	3	1	6	3	1	1	6	0	1	2	2	2	3
Novosibirsk region	1	2	4	2	1	3	1	0	3	0	-2	3	0	8	6	5	4	1	6	1
Omsk region	1	7	3	0	1	1	-1	1	4	-2	4	3	-1	7	5	1	1	1	4	1
Altai Republic	0	1	0	3	4	0	2	0	0	6	4	0	7	0	7	0	1	4	6	
Republic of Buryatia	0	2	0	1	-3	-2	1	6	1	5	1	1	2	6	1	5	0	4	4	6
Tyva Republic	-1	5	0	2	0	4	1	6	1	6	0	2	5	2	1	6	1	7	6	6
Republic of Khakassia	0	0	0	2	-4	-1	1	0	0	-1	1	-1	5	1	2	1	6	5	4	2
Tomsk region	2	4	0	0	1	2	0	3	3	1	3	1	1	0	0	1	5	3	2	5
<b>Far East Federal District</b>																				
Amur region	0	-1	0	1	-4	1	1	1	0	4	1	1	1	3	0	4	0	4	6	5
Jewish Autonomous Region	-1	0	0	3	-1	-4	3	6	1	4	7	0	0	2	0	5	6	6	2	3
Kamchatka Krai	-1	0	0	0	3	-2	1	7	1	6	0	0	0	6	0	-1	0	3	5	5
Magadan Region	-1	0	0	0	1	1	1	0												