Ecosystem Services of Russia

Volume 1

Services of Terrestrial Ecosystems

Prototype of National Report

http://www.biodiversity.ru/programs/ecoservices/first-steps/PrototypeES2015.pdf

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The assessment of ES of Russia was carried out by the Biodiversity Conservation Center (Moscow) in cooperation with Leibniz Institute of Ecological Urban and Regional Development (Dresden) in 2013-2015 in the framework of the Russian-German project "TEEB-Russia 1. Ecosystem Services Evaluation in Russia: First Steps" with the financial support of the German Federal Agency for Nature Conservation (BfN).

Units of assessment are subjects of the Russian Federation (the top-level administrative units), because the whole bunch of socio-economic data as well as some environmental indicators was obtained from governmental databases where it is provided on the level of subjects of the Russian Federation .

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

1. Direct quantitative evaluation when quantitative statistical data are available on stocks and use of resources.

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.

4. Formulation of the task of ES assessment, if methodological approaches aren't ready for the above methods or failed to get data

ES were evaluated either in physical terms or score points. Economic ES evaluation was not the goal of the first phase of the project.

Ecosystem services were evaluated on three indicators:

- **Provided -** ES produced by ecosystems regardless of the presence or absence of people (corresponds to the "potentials", i.e. the hypothetical maximum ES yield which can be potentially used by people; is not equal to "supply" after Burkhard et al. (2014), because doesn't account anthropogenic inputs).
- **Required -** ES yield necessary to fulfill the needs of population and economy of a region (is close to "demand" after Bastian et al. (2013) but differs from "demand" in the concept of Burkhard et al. (2014).
- **Consumed** - the yield which is materially or immaterially in use of population, or which people made the benefits of (is similar to "flows" (Burkhard et al., 2014) which means de facto used set of ES and other outputs from natural systems in a particular area within a given time period; in some cases is similar to "demand" in terms of Burkhard et al. (2014) which mean ecosystem goods and services currently consumed or used in a particular area, not considering where ecosystem services actually are provided).

Ratios and differences of ES volumes show the level of use of ES, relative provision and satisfaction of needs in ES

Vprovided/Vconsumed Vconsumed/Vprovided×100%	**The level of ES use**
Vprovided –Vconsumed	Unused (if positive) or overdrawn (if negative) ES volume
Vprovided/Vrequired Vrequired/Vprovided×100%	**The level of providing of ES**
Vprovided –Vrequired	Excess (if positive) or deficiency (if negative) of ES
Vrequired/Vconsumed Vconsumed/Vrequired×100%	**The satisfaction of needs in ES**
Vrequired –Vconsumed	Volume of unmet need for ES

The main conclusions

- The potential capacity of ES of Russia is comparable with needs of the people.
- A number of the most important life-supporting services are already fully used or even overused.
- Because of uneven space distribution of provided, required and consumed ES regions are divided into donors and beneficiaries of ES.

ES assessment reveals requirements to the national ES monitoring system:

- Monitoring and prognosis of biodiversity status as the basis for ES.
- Accounting for the full value of ecosystem services, including all major groups, primarily, regulating (environment-forming) ES.
- Assessment by three indicators: provided, required, consumed ES
- Accounting for spatial scales of ecosystem functions and ES.

The next step: project "TEEB-Russia 2. Biodiversity and Ecosystem Services: Management Principles in Russia"

Project goals:

- To evaluate the importance of biodiversity of Russia in maintenance of ES and formulate requirements for the national system of monitoring and management of ES and biodiversity of Russia.
- Further development of the framework methodology and indicators for ascertainment of ES and biodiversity in accordance with international standards as well as specific Russian conditions and scientific

Methods of assessment: Direct quantitative; Indirect quantitative; Score in points; Formulation of task

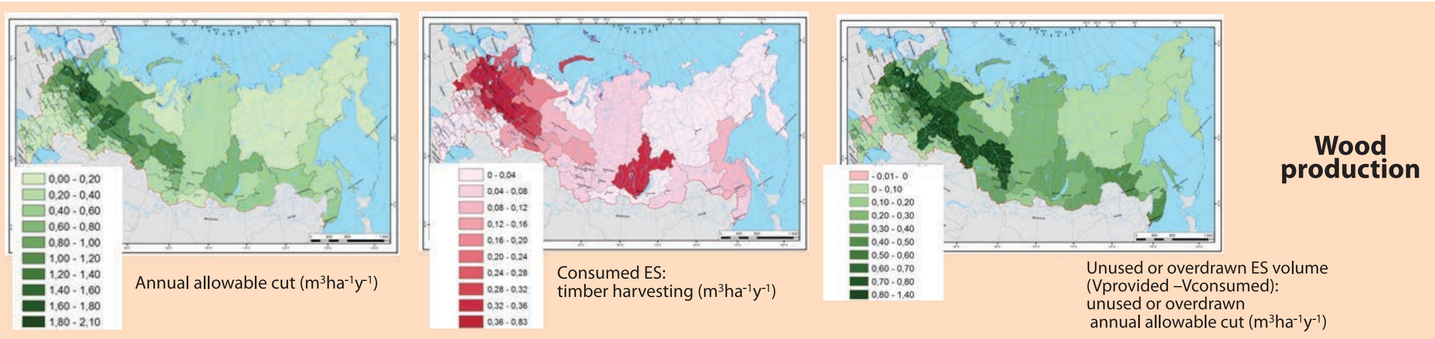
ECOSYSTEM SERVICES

EXAMPLES OF ASSESSMENT

PROVIDED ES | **CONSUMED or REQUIRED ES** | **Level of use, provision or satisfaction of needs in ES**

Provisioning (Productive)

- Production of timber and firewoods
- Production of non-wood plant resources
- Production of fodder by natural pastures and hayfields
- Production of fresh-water seafood
- Production of game resources
- Production of honey from natural meadows



Annual allowable cut ($m^3ha^{-1}y^{-1}$)

Consumed ES: timber harvesting ($m^3ha^{-1}y^{-1}$)

Unused or overdrawn ES volume (Vprovided –Vconsumed): unused or overdrawn annual allowable cut ($m^3ha^{-1}y^{-1}$)

Wood production

Regulating (Environment-forming)

Regulation of climate and atmosphere

- Biogeochemical regulation of climate (carbon, GHG)
- Biogeophysical regulation of climate
- Purification of air by vegetation

Regulation of hydrosphere

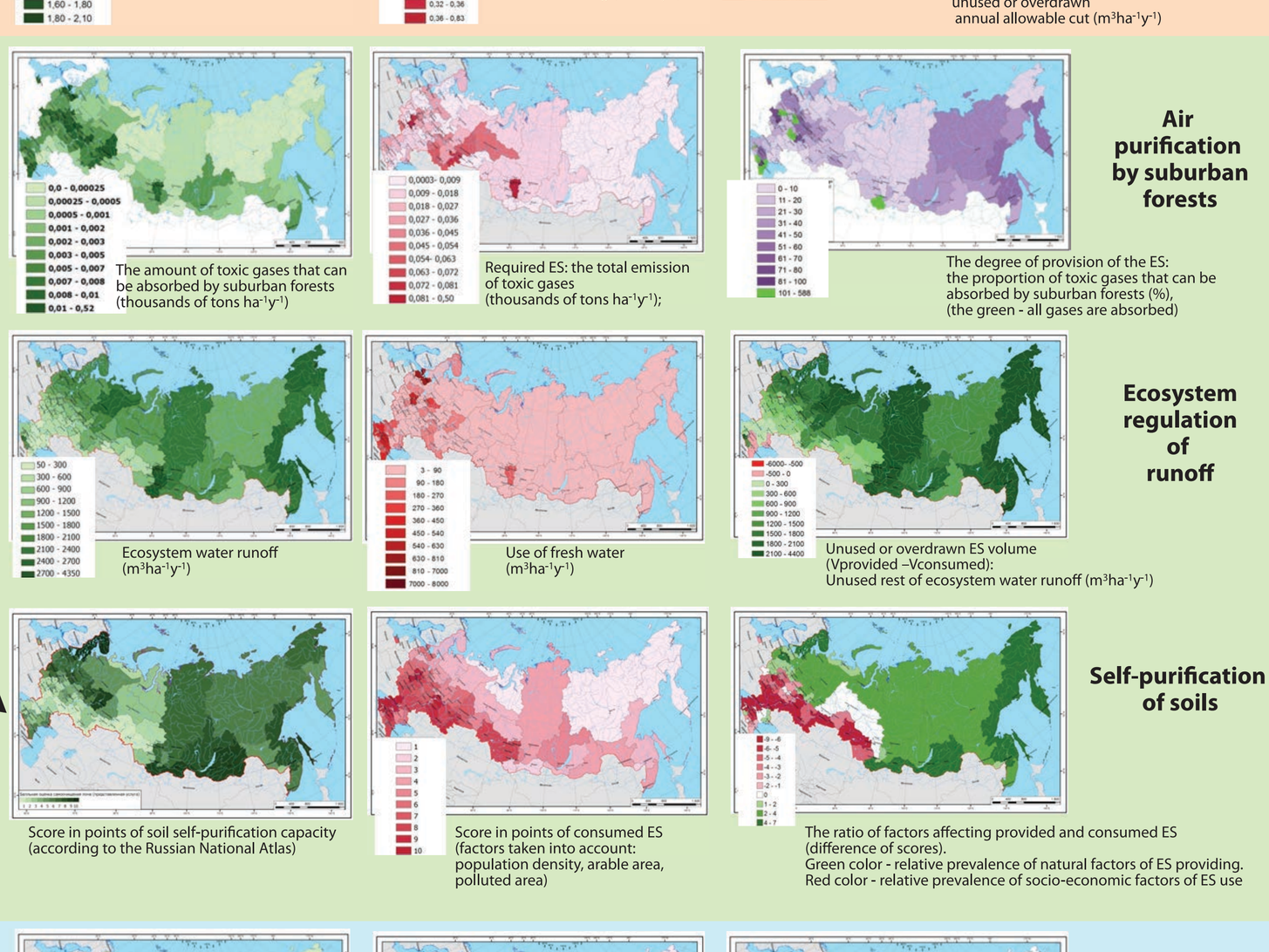
- Regulation of water run-off
- Providing of water quality by terrestrial ecosystems
- Self-cleaning of water in aquatic ecosystems

Forming and protection of soils

- Protection from water and wind erosion
- Prevention of landslides
- Forming of bioproductivity of soils
- Biological cleaning of soils, removal of pollutants
- Regulation of cryogenic processes

Regulation of biological processes which are important for economy and safety

- Regulation of agriculture and forest pests
- Regulation of pollinators
- Regulation of species which have medical importance



The amount of toxic gases that can be absorbed by suburban forests (thousands of tons $ha^{-1}y^{-1}$)

Required ES: the total emission of toxic gases (thousands of tons $ha^{-1}y^{-1}$);

The degree of provision of the ES: the proportion of toxic gases that can be absorbed by suburban forests (%), (the green - all gases are absorbed)

Air purification by suburban forests

Ecosystem water runoff ($m^3ha^{-1}y^{-1}$)

Use of fresh water ($m^3ha^{-1}y^{-1}$)

Unused or overdrawn ES volume (Vprovided –Vconsumed): Unused rest of ecosystem water runoff ($m^3ha^{-1}y^{-1}$)

Ecosystem regulation of runoff

Score in points of soil self-purification capacity (according to the Russian National Atlas)

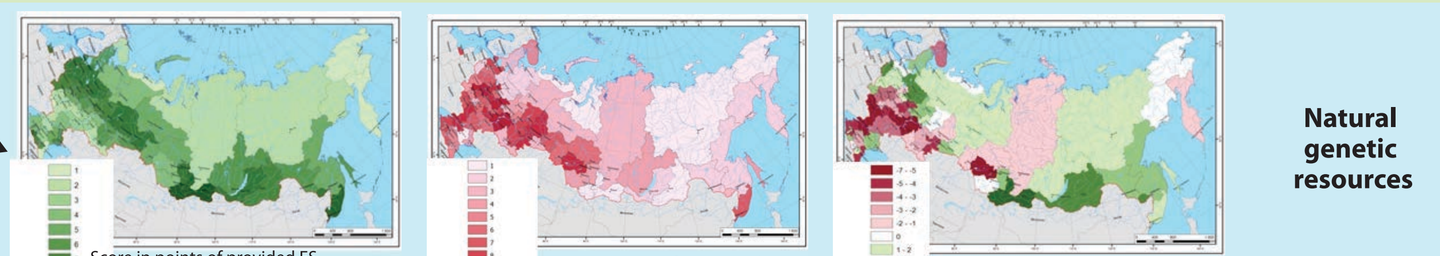
Score in points of consumed ES (factors taken into account: population density, arable area, polluted area)

The ratio of factors affecting provided and consumed ES (difference of scores). Green color - relative prevalence of natural factors of ES providing. Red color - relative prevalence of socio-economic factors of ES use

Self-purification of soils

Cultural (Informational)

- Genetic resources of native species and populations
- Information about structure/functioning of natural systems
- Aesthetic and cognitive value of natural systems.
- Ethical, spiritual, religious significance of natural systems



Score in points of provided ES (factors taken into account: species number of vascular plants per 100000 km^2 and the proportion of natural areas in the region)

Score in points of consumed ES (factors taken into account: costs of research in the regions)

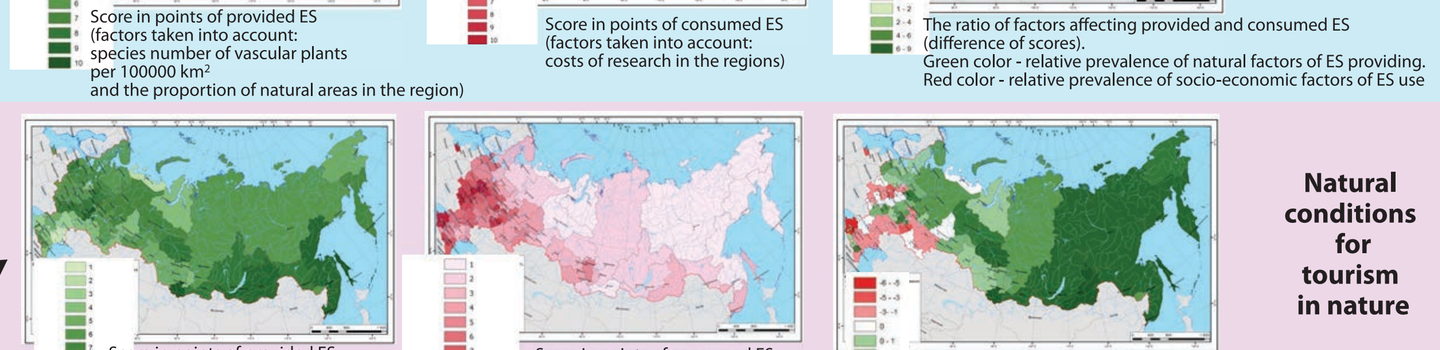
The ratio of factors affecting provided and consumed ES (difference of scores). Green color - relative prevalence of natural factors of ES providing. Red color - relative prevalence of socio-economic factors of ES use

Natural genetic resources

Recreational

Formation of natural conditions for the following types of recreation:

- Daily and weekend recreation
- Educational and active tourism in nature
- Wellness recreation at resorts



Score in points of provided ES (factors taken into account: the comfort of the natural conditions, the environmental situation, landscape diversity)

Score in points of consumed ES (factors taken into account: population density, density of roads and railways)

The ratio of factors affecting provided and consumed ES (difference of scores). Green color - relative prevalence of natural factors of ES providing. Red color - relative prevalence of socio-economic factors of ES use

Natural conditions for tourism in nature

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