Chapter 1
Role of Data Indices for UN Sustainable Development Goals Implementation in Russia

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Abstract In 2015, the UN adopted 17 Sustainable Development Goals (SDGs) and 169 corresponding targets. To reach these goals, it is needed to use different quantitative and qualitative indicators based on global, national, and country data. One of the useful indicators is the Environmental Performance Index (EPI) that grades countries' performance in relation to two principal environmental policy objectives: the Protection of Ecosystem Vitality and the Environmental Health. With regard to these principal objectives, the EPI covers nine problems' areas: Climate and Power production sector, Agriculture, Biodiversity Loss, Fisheries, Forestry, Water quality, Health Impacts, Air pollution, and Water sanitation. According to the 2016 EPI, Russia occupies the 32nd position in this rating. 40% of population in Russia is living at the territory occupying 15% of total country area with unfavorable environmental conditions because of air and water pollution, deforestation, biodiversity worsening and forests' cover loss, poor waste management. The World Wildlife Fund estimates annual loses of the country reached about 1 billion dollars from the illegal export of wood. The measures to improve energy efficiency policy, to decrease air pollution were studied for Baikal model region. It is expected that the SDG indicators will become a common reference point for national and subnational monitoring in the Russian Federation.

Keywords Sustainable development goals · Global indices · Indicators · Russia · Baikal lake

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1.1 Section

In 2015, the UN adopted historical Document "Transforming our world: the 2030 Agenda for Sustainable Development" with 17 Sustainable Development Goals (SDGs) and 169 corresponding targets. The SDGs comprise an integrated balance of all three domains of sustainable development: economy, society, and natural environment. The use of different quantitative and qualitative indicators based on global, national, and country data indices is presumed to be needed to reach the SDGs.

Many global (the World Bank, OECD, SCOPE, etc.) and some regional (the European Commission) organizations are actively working and promoting their own sets of indicators for sustainable development. The organizations have proposed the indicators for systems at different scales: global, regional, national, local, industry as well as at the level of individual settlements and enterprises.

The multiscale approach (country and municipal) with the use of global indices is implemented to analyze the ranking of Russia as well as to assess the ecological indicators influencing the measuring and planning of ecological activities at municipal level for a model region—Baikal region.

1.2 Study Area

The research was held for Russia to evaluate the rating in accordance with scores of global indices at country level and at municipal level for the Baikal region as a model study area located in the east part of Russia around the famous Baikal Lake and characterized by enormous potential for ecological wealth and resources with the huge world natural significance (UNESCO World Heritage site).

1.3 Data and Methodology

1.3.1 The Role of Global Indices and Indicators

The indicators displayed from the primary data allow the evaluation of efforts of governments, ministries, and other bodies taken to improve the situation and to change the economic, social, or environmental variables to reach sustainable development. During the last years in addition to the thematic indicators, the system of integral indices has been developed and applied in practice. Index is the aggregate or weighted indicators' system, based on several other thematic simple indicators or data. The use of indices is acceptable if its causal connection is well understood.

Indicators and indices are used as the basis to justify the decision through the quantification and simplification; to help to interpret the changes; to allow identifying weaknesses in ecological management; to facilitate access to information for different

categories of users; to facilitate the exchange of scientific and technical information. The indicators of sustainable development serve as the tool to support decision-making and planning in nature resources usage, to perform important functions to support the development plans, and to make easier communications. Therefore, the status of environmental indicators shall inform and attract public attention to certain environmental threats. This often mobilizes people for self-adoption of the necessary measures or treatment to authorities or private companies representatives.

One of the world-known ecological complex indexes is the Environmental Performance Index 2016 (EPI). It was elaborated with international efforts and presented in two manuscripts published by Yale University (Hsu et al. 2013, 2016). The 2016 EPI suggests a new paradigm to imply to nations' environmental policy. The state of a nation's environment is no longer an autonomous issue as it inevitably impacts its neighbors. Pollution does not recognize national borders—moreover, it could be even higher beyond state borders. This is also true for global dimension. Local activities could be superposed leading to stronger adverse effects at the global level. Implementation of the 2016 EPI serves for the purpose to portrait global environment through the prism of nations' environmental health. The index reflects these realities revealing global synergies of regional and local environmental impacts. It also shows areas where minor progress or even some deterioration is taking place.

The Environmental Performance Index (EPI) is based on more than 20 indicators referring to national and global environmental statistics (Hsu et al. 2016). The index presents aggregation of these parameters. The EPI ranks countries' performance in two areas of high-priority environmental policy objectives: the Protection of Ecosystem Vitality and the Environmental Health. The list of indicators used for the EPI is represented in Table 1.1. Within the two objectives, the EPI scores national performance in nine problematic areas: Climate and Power production, Biodiversity loss, Fisheries, Forestry, Agriculture, Water quality, Health Impacts, Air pollution, and

Table 1.1 The list of indicators of Environmental Performance Index (EPI) (*data source* Hsu et al. 2016)

Ecosystem vitality (divided into 9 issues)						Environmental health (divided into 3 issues)		
Issues								
Climate and energy	Biodiversity and habitat	Fisheries	Forests	Agriculture	Water resources	Health impact	Air quality	Water sanitation
Indicators (see the list below)								
1, 2	3, 4, 5, 6, 7	8	9	10, 11	12	13	14, 15, 16, 17	18, 19

List of indicators: 1. Carbon Intensity, per kWh; 2. Trend in Carbon Intensity; 3. Species Protection (National); 4. Species Protection (Global); 5. Terrestrial Biome Protection (National); 6. Terrestrial Biome Protection (Global); 7. Marine Protected Areas; 8. Fish Stocks; 9. Tree Cover Loss; 10. Nitrogen Balance; 11. Nitrogen Use Efficiency; 12. Wastewater Treatment; 13. Environmental Risk Exposure; 14. Household Air Quality; 15. Air Pollution Avg. Exposure to Fine Particulate Matter; 16. Air Pollution Fine Particulate Matter Exceedance; 17. Air Pollution, Avg. Exposure to NO_2; 18. Unsafe Drinking Water; 19. Unsafe Sanitation

Water sanitation. For each of the problems, the indicator is calculated on the base of global and national data to measure countries' progress toward the SDGs.

In 2016, 180 countries were evaluated and the new scoring altered the Index's previous application. Finland now took the top position, followed by Iceland, Sweden, Denmark, and Slovenia.

The other important index is the Global Innovation Index (GII), which has been elaborated by the business School for the World (INSEAD) since 2007, then with the support of Cornell University and World Intellectual Property Organization (WIPO) (Dutta et al. 2016).

In modern economic environment, a major driving force of growth is innovation, especially in the technological sphere. In 2016, 128 countries were evaluated by GII's 82 indicators. Assessment included several blocks important for innovation development: Human capital and research; Ecological sustainability; Market sophistication; Business sophistication, Innovation linkages, Knowledge and Technology output, Creative output. Each of the blocks was ranked by different indicators, which were calculated in percentages (Dutta et al. 2016).

The indicators of GII can be used for environmental evaluation of countries regardless of their specific circumstances. They present important statistics on the state of environment so far. A spatial and temporal coverage by datasets is a crucial characteristic for their applicability for the purpose of GII. The main ecological indicators assess country energy efficiency and energy consumption, greenhouse emissions and effect, waste management, access to clean drink water and other issues.

1.3.2 Country and Municipal Levels of Ecological Problems' Evaluation

As it was evaluated by the indices for country level, one of the main ecological problems is the increasing energy efficient use as well as preventing the green gase emissions. Russia is still characterized by very high energy intensity of its economy (exceeded the average world index by 2–3 times) and huge direct losses of energy due to outdate energy infrastructure (estimated at 15% for electric power and up to 50% for heat). Russia has to accept more serious obligations to deal with global climate change due to its high industrial emissions and huge potential to convert environmental issues into political, economic, and social problems, especially, at the local level.

The multiscale approach (at country and municipal levels) is implemented to rank Russian position in accordance with global indices as well as to assess the influence of ecological indicators on measuring and planning of ecological activities at municipal level for a model region.

According to the country's statistics, municipal sector consumes over 30% of the total energy produced in the Russian Federation. Therefore, this sector is responsible for the large portion of GHG emissions in the country. On the other hand, this provides

a great opportunity for a radical reduction of the emissions by modernizing of energy distribution and consumption systems and introducing relatively cheap and simple means for energy saving at individual consumer's level.

Energy efficiency (EE) and green energy policies should be introduced at municipal level countrywide. There is a long list of proved measures for modernization of energy distribution system in municipal sector such as the utilization of wood waste in municipal heating systems, deployment of solar batteries, applying new standards of buildings insulation, introduction of heat regulating devices and others.

The EE policies should be elaborated for each Russian region depending on its natural (primary climate) conditions, social–economic development, and available energy resources. There could be indeed very different energy efficiency programs as well as prospects for reduction of energy consumption in Russian regions.

1.4 Results and Discussion

1.4.1 Ecological Indices and Indicators for Russia Score Evaluation

To evaluate the ecological situation, the multilevel approach was used for country and municipal scales. According to the two discussed indices (EPI and GII), Russia has the potential to build up the level of energy efficiency and decrease carbon emissions, which will have positive effect on its economy. The reduction of greenhouse gas emissions, primarily CO_2, is the most important task. Different measures can be used to reduce the emissions, especially in industry and transport sector as well as in fuel and energy consumption. Countries adopted measures to reduce greenhouse gases perform further efficiency improvements.

In the EPI rating 2016, Russia occupied the 32nd place with score 83, 52, it had improved its rating for 24% for 2 years from the previous investigation and the EPI publication. The main Russian ecological problems assessed in the framework of the investigation of ecological efficiency indices and collection data were the air pollution with CO_2 and NO_2, carbon intensity, wastewater treatment, forest cover losses, problems of protected areas, biodiversity and terrestrial habitat conservation and water species protection, etc.

By general GII assessment, Russia occupied the 43rd place with score 38.5. During calculation, GII was divided into Innovation Input Sub-Index (Russia was on 44th place) and Innovation Output Sub-Index (Russia—47th place). In the framework of the general ecological sustainability, Russia has 94th rank for GDP/unit of energy use, PPP$/kg oil eq—114th place, Environmental performance—32nd place, ISO 14001 environmental certificates/bn PPP$ GDP—91st place.

1.4.2 Multiscale Evaluation of Ecological Problems for Sustainable Development Planning

At country scale, one of the ways to improve Russian rating of EPI and GII is the adoption of the Government Act of the best available technology (BAT) implementation to decrease negative impact from environmentally hazardous enterprises. BAT is the new approach to sustainable development, which facilitates the implementation of green economy (green growth) approach based on the comprehension of significant role of environmental factors for future human well-being.

In Russia, the best available technology has been emerging in recent years, thus its realization in practice was complicated and slowed due to gaps in legislation and some contradictions in legal system. Notwithstanding, the new tendency of active adoption and implementation of BAT is widely observed in Russia today. First of all, the Federal Law "On the protection of the environment" (from 07.21.2014, no. 219-FZ) was modified: the legal definition of BAT and its principles, categories of environmentally dangerous enterprises, requirements for obligatory execution of programs for environmental efficiency improvement, rates of negative impact on the environment were legally defined by the adjustments of the law. At the same time, Rosstandard signed the Order No. 1920 on the 3 December 2014 to establish the BAT Bureau with the status of governmental regulation body. Its objectives are to remove administrative barriers and reduce excessive regulation as the important recommendations for BAT Reference Books creation. These documents mention the importance of the enterprises division in the categories, and the application to them adequate different measures.

Particularly important is the BAT incorporation in the sphere of energy efficiency policy development. Improvements of the energy saving and the air pollution reduction systems are the essential elements for resource preservation.

It is expected that from 2015 to 2017, the BAT implementation in Russia facilitates the carrying out of the public record of all the enterprises, their division in categories, publishing the Reference Guides on BAT, and adoption of all BAT regulations. In the coming time, around 300 Russian enterprises will be determined as the key pollutants and from 2019, the use of BAT will be obligatory for them. The same year, the BAT must be employed for designing of new businesses. Until 2025, all enterprises of the first category will get comprehensive environmental permits. As a result, during the 1st period (2015–2021), it is expected to decrease negative impact in the country for not less than 15%, during the 2nd (2021–2026)—for 45–50%, for the 3rd (2026–2031)—for 75–80%, in the 2033–2040s, around 15 000 enterprises shall correspond the BAT requests.

The system of environmental law will be based on motivation principles: the benefits for the payments; set-off cost for the enterprise if it takes measures to decrease the negative impact; the provision of tax privileges for businesses obeyed the BAT and others. Listed approaches for the BAT development will facilitate the growth of enterprises' efficiency as well as have a positive effect on ecological conditions in Russia.

The other way to improve energy efficiency policy and to decrease air pollution was studied at municipal scale (Milanova 2012) for the Baikal region, including the Irkutsk region and the Republic of Buryatia. This region was considered as the model study area due to the fact that it is treated as the region of the world natural heritage and the necessity to improve the municipal energy usage avoiding the risks to nature and people's well-being.

Baikal region is located in the east part of Russia near the famous Baikal Lake and characterized by uniqueness of biodiversity, possesses an enormous potential of ecological wealth and resources for tourism and recreation development, medical healthy sources and sites. 20% of the planet's freshwater is accumulated in the Baikal Lake. Under the conditions of ecological crisis, the value of virgin nature will be continuously growing; therefore, the conservation of the Baikal region biodiversity is the most important factor of the world community sustainable ecological development. Nowadays, the Baikal region has a well-developed network of nature conservation areas (more than 20 sites, which occupy 3 mln ha). They include state nature reserves (part of them are biosphere reserves with status of UNESCO World Heritage sites), national parks, specially protected sites, nature monuments, healthy sources and sites.

Several ecologically orientated energy efficiency (EE) projects were implemented in the region, with support of the government and different ecological funds. The aims were to set up the system of rational energy use and to improve the quality of people's life. In the framework of the projects, the priority was given to the wider use of biomass (wood waste), gas, and electricity for heating instead of using coal.

The projects helped for the better ecological situation in the region because the level of local high-ash coal consumption and the volume of GHG emissions were decreased at the same as the problem of wood waste was resolved.

One another approach which was used during the projects is the installations of solar batteries. The Republic of Buryatia and the Irkutsk region have the same number of sunshine hours as the South Europe regions, it accounts for 2200–2500 h annually and the solar energy can be widely utilized. Additionally, some projects were devoted to the minimization of irrational resource consumption what was reached by the means of heat and energy metering facilities installation. These measures enabled to reduce the volume of energy and hot water use up to 20%, which gave the expenditure savings for local people and set up optimal thermal regime in their houses.

Reached energy efficiency savings can re-invest into social infrastructure and facilitate the better profitable municipal budget, which all together would lead to a further building-up of capacity for sustainable development at local level (Milanova and Zaitsev 2013). The additional benefits are the reduction of GHG emissions and positive effects on the environment and socio-economic conditions.

Therefore the general strategy of EE at municipal level should include approaches to attract investors, to conduct political reforms at different levels, to form conditions that legally allow re-investments of energy efficiency savings into municipal development projects as the innovation of technical facilities and municipal management systems.

The local sustainable community development indicators were used to evaluate the EE project results. In compliance with ecologically oriented approach, the sustainable communities' success formulas are defined by two parameters:

(1) community improvements (better environment, ecologically responsible business, optimized energy and resources consumption, improved life quality), and
(2) enhancing positive community processes (widening of ecological resources management, expanding multi-stakeholders cooperation, growing of people awareness on nature status, increasing transparency of local ecological policy and public involvement in its implementation and decision-making).

The system of monitoring and indicators for evaluation of projects' influence on community sustainable development and people's well-being is elaborated. It includes different aspects of healthy community:

– environment improvement: pollution/waste reduction, creation of recreation areas/nature parks, development of ecotourism and ecologically responsible business;
– energy and other nature resources efficient usage: usage of ecologically safe fuel (wood waste, alternative sources), reinvestment of energy savings into decision of community socio-ecological problems and introduction of new technologies;
– ecological education: altered ecologically responsible behavior models, wide public involvement into ecological activities;
– people health improvement: better environment conditions, better drinking;
– water quality, public recreation facilities;
– people well-being improvement: reduction of energy rates and people expenses, new jobs creation and lower unemployment level, youth involvement into community activity and reduction of youth outflow, common growth of economic well-being in the municipal communities.

1.5 Conclusion

The global indices and indicators are the tools to evaluate sustainable development goals implementation at all levels (from local community to the country and the whole world). The rating of Russia was assessed on the base of Environmental Performance Index and Global Innovation Index to assist the indication of appropriate way to solve such important ecological problems as energy efficiency and air pollution by GHG reducing. At municipal level, the influence of energy efficiency projects was evaluated for the model Baikal region (UNESCO heritage site) on the base of elaborated indicators, which show the projects' influence on sustainable communities' development and improvement of people's life quality.

The BAD is considered as a new approach to sustainable development in Russia. Based on the principles of minimum environmental impact, it enables the formation

of ecological sustainability. The only condition to support the strategy of ecologically sustainable development according to the SDGs at country and municipal level is the efficient assistance for country and regional development from authorities (governments, business and social organizations partnerships and cooperation) and the world community.

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