Main implementation criteria of the Ecology National Project in Russian regions

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Abstract. The article shows that Russia regulates air and forest protection and conservation using national projects, e.g. the Ecology Project. A comparative analysis of relative indicators calculated using the suggested methods helped rank each region by the criteria of management of and contamination in three environmental components: atmosphere (air), hydrosphere (water), and forests (plants). The findings of the comparative analysis carried out for the regions to assess the condition of their environmental components, pollution levels, and conservation spending make it possible to determine strategic areas of conservation efforts for different planning horizons.

1. Introduction
The study is relevant owing to the fact that the need to protect environmental components and reduce the pollution levels was first acknowledged in the Stockholm Declaration of 1972. Then, at the 1992 United Nations Conference in Rio de Janeiro, a sustainable development concept for countries was formulated [1]. Then, in the framework of the United Nations Framework Convention on Climate Change, the so-called Paris Agreement was signed on 22 April 2016.

The Russian Federation adopted the Paris Agreement in 2019, committed to reduce its greenhouse gas emissions to no more than 70% as of the 1990 level by 2030 [2]. Pursuant to this agreement, the industrial sector reduced the emissions in 2018 by 14.2% compared to the 1990 level. There is, however, no stable positive development because the 2018 indicator had increased by 4.6% compared with 2017. [3]. It is absolutely obvious that the international conferences and the relevant documents primarily focus on just one environmental component (atmosphere) out of the existing eight ones. On 5 January 2016, the President of the Russian Federation therefore signed a Decree declaring 2017 the Year of Ecology in order to increase the environmental safety of the country [4].
In 2017, the International Group of Experts for the Pact (IGEP) started drafting a project called Global Pact for the Environment [5], to be adopted at the 2022 Earth Summit. Unlike the previous documents, this one will become a multilateral international agreement establishing major environmental rights and conservation principles in the countries, using a comprehensive and non-sectoral, i.e. systemic, approach to the environment [6].

The goal of the study is to determine the condition of, pollution levels, and conservation spending in the North-Western Russian Macrorregion based on a comparative analysis of relative indicators calculated using various methods.

2. Materials and methods

In order to assess the condition of, pollution levels, and conservation spending in the environmental components in the regions in question, we included the relevant absolute and relative indicators from annual state statistical reports of 2014 and 2017–2018 into the minimum set of indicators. That statistical sample helps us make a comprehensive assessment of the condition of and pollution levels in the three environmental components as well as track the rate of change (growth) for the indicators in the regions within the North-Western Russian Macrorregion.

The study is based on the main principles of the systemic, comprehensive, and qualimetric methodological approaches, employing a proportionate and balanced assessment of the condition of, pollution levels in the environmental components, and conservation spending. The study uses the statistical and index methods of regional qualimetry and the methods of financial and economic analysis.

3. Results and Discussion

Transparency and balance have been declared the main principles of conservation. Transparency means the need for a unified international system for reduction of harmful and polluting emissions and five-year reporting. Balance means offsetting the current manmade emissions with greenhouse gas absorption in the second half of the century.

Special attention should also be paid to economic indicators, such as conservation costs for the environmental components; loss and damage from contamination of the environmental components and rising global temperatures.

The Russian Federation plans to invest up to $200 bn until 2035 in support and development of energy efficiency in order to build a low-carbon economy and prevent global temperature rise.

In 2018, a Decree of the President of the Russian Federation (No 474 of 21 July 2020) established twelve national projects that determined strategic development areas in each region until 2030 [7]. Each national project includes several federal projects, where the development goals and areas are detailed and specified.

The condition of environmental (natural) components is to be improved by the Ecology National Project. It includes ten federal projects, namely: clean country, solid waste management, hazardous waste disposal, clean air, clean water, restoration of the Volga, conservation of Lake Baikal, conservation of biodiversity and ecotourism, conservation of forests, and introduction of state-of-the-art technologies.

However, the projects do not encompass all of the eight environmental (natural) components for the purpose of preservation and improvement and therefore do not follow the systemic (non-sectoral) and comprehensive methodological approaches to conservation management. In our view, projects to conserve the land (territory), soil, and subsoil (lithosphere) are absent.

For instance, eight out of ten federal projects within the Ecology National Project apply to the North-Western Macrorregion, that is, all but two: restoration of the Volga and conservation of Lake Baikal.

Annual government statistical reports contain indicators that may serve as parameters to assess the condition of environmental components and environmental component improvement criteria for the goals stated in the federal projects. However, the indicators in those reports can only be used for
assessing the results of three federal projects: Clean Air [8], Clean Water [9], and Conservation of Forests [10], with no indicators existing for the other federal projects. The situation shows that there are no systemic and comprehensive methodological approaches to and no transparency principle in reporting on the environmental condition indicators (parameters).

All of the existing government statistical reporting indicators can be divided into two groups by negative or positive dynamics.

The first group includes those where the quantitative increase means improvement of the environmental components: land area in the category of forests, entrapment of air pollutants from stationary sources, share of the entrapped and neutralised pollutants in the total amount of air pollutant emissions from stationary sources, volume of circulated and running water, total land area of forest resources and other categories where forests are located, share of forest-covered area, presence of forests in the area, total timber resources, and forest restoration [11].

The second group includes the indicators to be reduced for the federal projects to be successful: emissions of air pollutants from stationary sources, intake water use, discharge of contaminated water to surface water bodies, wildfires in forest resources and other types of land, number of wildfires, and wildfire-affected area.

The third group includes two economic indicators to assess the efficiency of the federal projects: conservation spending and conservation spending amount index.

To carry out a comparative analysis for the condition of the three environmental components in question as of 2018 as the year when the Ecology Project was launched, we transform all absolute quantitative indicators from the annual government reports into relative ones by dividing them by the land area of the region or the forest area measured in thousand square km.

The calculation of the share (specific area) of the regions in the North-Western Macroregion shows that the Komi Republic and Arkhangelsk Oblast without Nenets Autonomous Okrug have almost the same share, slightly over 24%. The Republic of Karelia and Nenets Autonomous Okrug also have comparable shares, 10.7% and 10.5%, respectively. Vologda and Murmansk Oblasts each take up 8.6% of the land area of the North-Western Macroregion. Leningrad Oblast takes up 5% of the whole land area, and Pskov and Novgorod Oblasts have similar areas of 3.3% and 3.2%, respectively. The area of Kaliningrad Oblast is 1% and Saint Petersburg 0.1%. We can therefore identify four pairs of regions and compare the environmental components in the regions in pairs.

Thus, the first group includes the following indicators per land area unit: entrapment of air pollutants from stationary sources, thousand tonnes per thousand square kilometres; volume of circulated and running water, million cubic metres per thousand square kilometres; total timber resources, million cubic metres per thousand square kilometres; forest restoration, hectares per thousand square kilometres.

The group also includes relative indicators: share of land area of forest resources and other categories where forests are located, percent; land area in the category of forests in the total area, percent; share of forest-covered area in the forest resources and other land categories, percent; share of the entrapped and neutralised pollutants in the total amount of air pollutant emissions from stationary sources, percent; presence of forests in the area; percent.

Similar calculations were made for the following indicators from the second group: emissions of air pollutants from stationary sources, thousand tonnes per thousand square kilometres; intake water use, million cubic metres per thousand square kilometres; discharge of contaminated water to surface water bodies, million cubic metres per thousand square kilometres, land area affected by wildfires, hectares per thousand square kilometres of forest resources and other land categories where forests are located. The number of wildfires is presented as an absolute quantitative indicator.

The third group, which contains economic indicators, includes a relative indicator: conservation costs in actual applicable prices, million RUB per thousand square kilometres of land area. The other one is the conservation spending amount index in comparable prices, percent to the previous year.

Table 1 shows the relative indicators demonstrating the condition of and pollution levels in two environmental components: atmosphere and hydrosphere. It also shows the conservation spending per
thousand square kilometres of the regions in question. The regions are ranked down from the first place assigned to the region with the lowest relative pollution level and the most reasonable resource allocation.

**Table 1.** Environmental components assessment in Russian regions in 2018.

| Region                        | Entrapment of air pollutants from stationary sources | Volume of circulated and running water | Emissions of air pollutants from stationary sources | Intake water use | Discharge of contaminated water to surface water bodies | Conservation spending |
|-------------------------------|-----------------------------------------------------|----------------------------------------|-----------------------------------------------------|------------------|-------------------------------------------------------|------------------------|
| North-Western Macroregion     | 3.6 - 7.1                                           | 1.1 - 5.7                               | 1.5 - 51.7                                          |                 |                                                       |                        |
| Republic of Karelia           | 0.5 9 6.2 7                                        | 0.7 3 1 2                               | 0.1 2 16.3                                          |                 |                                                       |                        |
| Komi Republic                 | 0.6 8 2.0 9                                        | 1.2 5 1.1 3                             | 0.6 4 33.1                                          |                 |                                                       |                        |
| Arkhangelsk Oblast            | 1.0 6 2.2 8                                        | 0.3 1 1.3 5                             | 0.8 5 15.4                                          |                 |                                                       |                        |
| Vologda Oblast                | 15.2 3 27.3 3                                      | 2.6 8 1.7 6                            | 0.9 6 32.5                                          |                 |                                                       |                        |
| Leningrad Oblast              | 0.7 7 32.3 2                                      | 1.6 7 7 6.6                              | 9 120.5                                             |                 |                                                       |                        |
| Murmansk Oblast               | 13.0 4 23.7 4                                      | 2.6 8 66.4                              | 9 199.7                                             |                 |                                                       |                        |
| Novgorod Oblast               | 3.7 5 7.3 6                                      | 1.5 6 10.0                              | 8 2.1 7 132.8                                       |                 |                                                       |                        |
| Pskov Oblast                  | 25.4 2 17.4 5                                      | 1.0 4 1.7 6                            | 0.5 3 33.5                                          |                 |                                                       |                        |
| Saint Petersburg              | 0.3 10 0.1 11                                     | 0.7 3 1.2 4                            | 0.6 4 21.1                                          |                 |                                                       |                        |

As shown in Table 1, there is a strong correlation between the indicators and the land area, which is evidenced by Saint Petersburg taking up 0.1% of the macroregion. The condition of and pollution levels in the two environmental components were compared by six parameters by grouping the regions in pairs. The comparison showed that the Komi Republic and Arkhangelsk Oblast had the same cumulative ranking of 35. There was a small difference of 2 points between Vologda (33 points) and Murmansk (35 points) Oblasts. A considerable difference of 15 points was observed between Novgorod Oblast (25 points) and Pskov Oblast (40 points). It is impossible to compare the condition of the environmental components in Nenets Autonomous Okrug and the Republic of Karelia since the 2018 annual government statistical report did not include all of the indicators. A comparative analysis like this helps set goals and implementation criteria as well as plan and fund improvement of environmental components.

For a more adequate assessment, we suggest using the method of relative indicators, using the gross regional product (GRP), the main economic regional indicator, as a base indicator. The indicator shows how actively the natural resources are used in the economy and how much the environmental (natural) components are affected. Since statistical reports show this indicator a year later than the other ones, we used the 2017 data.

Table 2 shows the two indicators meant to show a quantitative increase because of conservation efforts within the federal projects. The indicators are the volume of circulated and running water and conservation spending. The growth rates of the other three indicators – emissions of air pollutants from stationary sources, intake water use, and discharge of contaminated water to surface water bodies – are supposed to show negative values.
Table 2. Changes in environmental component indicators in 2017 compared with 2014 per million RUB of gross regional product.

| Region* | Volume of circulated and running water | Emissions of air pollutants from stationary sources | Intake water use | Discharge of contaminated water to surface water bodies | Conservation spending |
|---------|----------------------------------------|-----------------------------------------------|-----------------|---------------------------------------------------|---------------------|
|         | mln m³/mln RUB | thousand tonnes/mln RUB | mln m³/mln RUB | mln m³/mln RUB | growth rate to 2017 from 2014, % | growth rate to 2017 from 2014, % | growth rate to 2017 from 2014, % | growth rate to 2017 from 2014, % | RUB / RUB *100 % |
| 1       | 1822 | 1371 | -25 | 380 | 234 | -38 | 1689 | 1170 | -31 | 450 | 338 | -25 | 1.2 | 1.1 | ↓ |
| 2       | 5115 | 4139 | -19 | 497 | 451 | -9 | 1009 | 669 | -34 | 1161 | 874 | -25 | 1.5 | 1.2 | ↓ |
| 3       | 3092 | 1472 | -52 | 1460 | 785 | -46 | 956 | 844 | -12 | 223 | 456 | -105 | 2.0 | 2.4 | ↑ |
| 4       | 2384 | 1897 | -20 | 495 | 323 | -35 | 1681 | 1193 | -29 | 945 | 696 | -26 | 1.4 | 1.4 | 0 |
| 5       | 32 | 87 | 172 | 460 | 362 | -21 | 48 | 54 | 13 | 0 | 0 | 0 | 0.5 | 0.3 | ↓ |
| 6       | 9252 | 7644 | -20 | 1268 | 844 | -33 | 1242 | 447 | -64 | 354 | 309 | -13 | 1.5 | 0.9 | ↓ |
| 7       | 1576 | 1164 | -26 | 60 | 62 | 3 | 347 | 259 | -25 | 328 | 266 | -19 | 0.4 | 0.4 | 0 |
| 8       | 1474 | 1395 | -5 | 387 | 234 | -40 | 7783 | 5723 | -27 | 385 | 289 | -25 | 3.4 | 1.7 | ↓ |
| 9       | 2754 | 2319 | -16 | 841 | 545 | -35 | 4749 | 3181 | -33 | 1008 | 713 | -30 | 2.4 | 4.3 | ↑ |
| 10      | 2919 | 3442 | 18 | 205 | 197 | -4 | 425 | 338 | -21 | 358 | 104 | -71 | 0.9 | 0.7 | ↓ |
| 11      | 32 | 20 | -38 | 234 | 213 | -1 | 1405 | 930 | -34 | 299 | 244 | -18 | 0.6 | 0.8 | ↑ |
| 12      | 287 | 194 | -32 | 27 | 23 | -15 | 336 | 220 | -35 | 396 | 265 | -33 | 0.5 | 0.5 | 0 |

*1-North-Western Macroregion. 2-Republic of Karelia. 3-Komi Republic. 4-Arkhangelsk Oblast without Nenets Autonomous Okrug. 5-Nenets Autonomous Okrug. 6-Vologda Oblast. 7-Kalinigrad Oblast. 8-Leningrad Oblast. 9-Murmansk Oblast. 10-Novgorod Oblast. 11-Pskov Oblast. 12-Saint Petersburg.

As shown in Table 2, positive rates for the volumes of circulated and running water existed only in two regions out of the eleven ones in question: Nenets Autonomous Okrug and Novgorod Oblast. The other nine regions show negative rates, demonstrating that the plans for using circulated and running water in production of goods and services have to be adjusted. Conservation spending on all the environmental components in the regions is negligible: maximum 4.3% in Pskov Oblast and minimum 0.3% in Nenets Autonomous Okrug in the total gross regional product of the regions in 2017. The spending in 2017 compared with 2014 only increased in three regions: Komi Republic, Murmansk Oblast, and Pskov Oblast. In three regions (Arkhangelsk Oblast, Kaliningrad Oblast, and Saint Petersburg), the spending remained the same, and it was cut in the other five regions.

The emissions of air pollutants from stationary sources decreased in all the regions, by 46.23% in the Komi Republic (maximum) and by 1.28% in Pskov Oblast (minimum), which is a positive development. The indicator insignificantly increased only in Kaliningrad Oblast by 3.33%.

The intake water use also dropped in ten regions, by 64.01% in Vologda Oblast (maximum) and by 11.72% in the Komi Republic (minimum). It was only in Nenets Autonomous Okrug where the intake water use rose by 12.5%.

The discharge of contaminated water to surface water bodies considerably increased only in the Komi Republic (104.48%). In the other regions, the indicator value shrank by 70.95% in Novgorod Oblast (maximum) and by 12.71% in Vologda Oblast (minimum).

4. Conclusion

The methodology suggested by the authors [12] is therefore more adequate for assessing condition parameters of environmental components relative to the gross regional product than other calculation methods.
methodologies tied to the land area or number of economically active population because all regions differ in population density, number of enterprises, and land area. Therefore, indicators relative to million RUB of the gross regional product are more suitable for analysing the condition of and pollution levels in environmental components. Such an analysis helps identify whether the principles of proportion and balance between economy and conservation are present in the region and set strategic goals and criteria for improvement of environmental components in combination with further development of industrial activities.

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