

Environmental Economics and Sustainable Development

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Abstract. Global climate change has an impact on the human potential, economy and ecosystems of all countries of the world, including Russia. A significant contribution to climate change is made by the burning of fossil energy resources, which leads to an increase in the concentration of greenhouse gases in the atmosphere and causes the greenhouse effect. The main consequences are an increase in the average annual temperature and the melting of glaciers, which leads to a rise in the level of the world ocean, as well as severe droughts and fires, floods and tsunamis, and a decrease in biodiversity. These changes have a negative impact on the quality of life of people, including the availability of food, health, the suitability of territories for housing and economic activity, and much more. The global challenges facing the world community as a result of climate change are shaping a comprehensive agenda for international cooperation over the next few decades. The relevance of this agenda will constantly increase, regardless of the various factors of international tension.

1 Introduction

The transition to a green growth model in this area, given the complex problems of industrial development, involves increasing the efficiency of resource use, expanding the recycling of raw materials and waste processing, as well as massive investments in green technologies, without which a fundamental change in the current situation is impossible. An important step is to maintain and strengthen the growth dynamics of renewable energy, which is included in the list of technological development priorities in many countries. Agriculture plays a significant role in promoting green growth, especially in developing countries, in many of which it is a central element of the national economy. To date, a limited number of these countries have managed to move on to the rails of industrial development, and in the least developed countries, it is the agricultural sector and animal husbandry that make it possible to provide a minimum level of income for the vast majority of residents. When focusing on green growth in this industry, it is necessary to take into account the whole range of environmental problems that directly affect the efficiency of agricultural activity. Desertification can be singled out as the most acute, which reduces the total amount of cultivated land and pastures, insufficient supply of fresh water, the largest

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consumer of which is agriculture (71% of world consumption). The development of environmentally oriented agriculture will provide an opportunity to solve the most acute problems enshrined in the UN Millennium Goals, primarily reducing poverty and improving food security. The transition to a green development model in the industry will increase the average level of food calories (up to 3200 kcal by 2050), increase the efficiency of arable land use, reduce production waste, reduce food losses as a result of improved technology, production organization and logistics, and can also contribute to solving the problem of poverty.

The transition to a green economy is an extraordinarily complex and complex issue with many common challenges. Their depth and seriousness are due to the unprecedented challenges facing humanity. A deep transformation is needed not only in the world economy, in fact, we are talking about changing the entire economic structure and lifestyle of people. So far, despite the acceleration of the processes of development and implementation of the green growth model, the process has been insufficient and clearly lags behind the rate of increase in the environmental degradation of the planet.

2 Research Methodology

Attempts to theoretically study the concept of sustainable development in the UN agencies (UNEP, UNESCO, WHO, etc.) after the Brundtland Commission were practically not undertaken. But in scientific circles, independent of these official organizations, there have been many such attempts [8]. The most significant is the one associated with the theory of biotic regulation of the environment developed by the Russian biophysicist V. G. Gorshkov⁵. Without delving into the details of this theory, we confine ourselves to its main provisions that are directly related to the issues of sustainable development. Approximately 3.85 billion years ago, conditions favorable for the emergence of life developed on Earth. This could happen only under certain abiotic conditions, primarily with the flow of solar energy that the Earth receives. But with the same flow, the Earth could well have been an inanimate planet, devoid of an atmosphere, at least an oxygen atmosphere, practically devoid of water in a liquid state (either ice, as on Mars, or steam, as on Venus). The state of the environment on Earth is not physically stable, it is constantly subjected to changeable influences: external (cosmic - changing solar activity, meteorite impacts, etc.) and internal (geological - volcanic eruptions, etc.) [9]. However, the main characteristics of the environment on Earth have changed little over billions of years, primarily this applies to the global average surface temperature (it fluctuates slightly around +15 °C, although its physically possible values are determined from below by the global average near-surface temperature on Mars: -40 °C, and above - the value of this indicator on Venus: +460 °C). The emerging biota existed, reproduced, developed, modifying the environment, and these changes were directed: they created conditions suitable, moreover, optimal for the preservation, reproduction of life, for its sustainability. And the environment in which the biota has existed for 3.85 billion years was created by the biota - developing, evolving under the influence of various impulses (both external - abiotic and internal) and rebuilding the environment in accordance with both external factors and its own changes. Naturally, this environment is "built" from that "material", based on the possibilities that existed on the planet before the emergence of life and were preserved during its evolution: solar energy, the chemical composition of the earth's crust, meteorological processes, etc. It is time to clarify the very concept of the environment [10].

3 Results and Discussions

In Russia, the regulatory and legal framework necessary for the development of organic production has been formed: in 2015–2021, a number of state standards came into force, and in 2020 a federal law¹⁵ created legal grounds for combating greenwashing, the emergence of Russian certifying companies and regulated labeling of organic products. According to FiBL, in 2020, the area of land certified for organic production in Russia amounted to 0.62 million hectares¹⁶; as of February 18, 2022, 101 farms in 40 regions of the country were included in the official register of organic producers (mainly in the Center and in the South of Russia, in the Middle Volga region and in the south of Western Siberia). We are talking about both large companies (AgriVolga holding, structures of HiPP Rus and Nestle Russia) and farms. And taking into account companies working with foreign certificates, the total number of organic producers in Russia is within 150; another 10 companies are involved in the production of organic fertilizers and biological products. Nevertheless, compared to other European countries, organic agriculture in Russia is still in its early stages of development: in Germany, France and Spain, the number of producers is in the tens of thousands, and the share of land certified for organic production in the EU exceeds 9%¹⁹. For the production in Russia of 10% of the world's organic production, it is necessary to certify at least 14.5 million hectares of land, which is 50 times more than the current level. Prospects for future growth are due to the stable growth of the organic market (in 2021, its volumes approached the mark of 8 billion rubles) and the possibility of putting previously abandoned agricultural land into circulation. In Russia, according to various estimates, about 50–75 million hectares of land have been withdrawn from agricultural production; out of 122 million hectares of arable land, 4.9 million hectares are officially transferred to fallow land. The main condition for organic production is the rejection of synthetic fertilizers, pesticides and feed additives in favor of maximizing the natural potential of natural landscapes. The non-Black Earth region, where chemical fertilizers were not used on abandoned fields for 2–3 decades (for example, the basin of Lake Nero, the former vegetable garden of Russia, the lands of the Vladimir opolye), terraced farming areas in the North Caucasus, mountain pastures, taiga regions of European Russia and Siberia, rich in wild plants, can be ideal areas for the development of farming organic agriculture, based on modern technologies, the agrarian history of the region and the experience of the local population. An unexpected factor in favor of organic agriculture may be climate change. So, in the North Caucasus, there is already a noticeable increase in the altitudinal boundaries of fruiting fruit plantations. In Dagestan, a program for the development of mountain gardening has been developed, which involves the involvement in the circulation of terraced lands suitable for laying gardens at a wide range of altitudes (for example, in the Laksky district up to 2100 m above sea level)²³. Despite the unsettled land relations, which is the main obstacle to obtaining state support, the revival of horticulture, supported by large investors (Agricultural Holding Ecoculture, etc.), can become one of the incentives for the development of organic farming in the region. The industry was not included in the State Program for the Development of Agriculture until 2025²⁴, but many regions developed their own support programs for organic producers (Voronezh region, Tatarstan, etc.), which quickly affected the growth in the number of small organic farms (according to the National Organic Union). The main problems hindering the development of organic production are the low density of organic farms, usually located far from each other; lack of local associations of producers for the exchange of experience and knowledge; the inability of farmers to maintain the documentation necessary to track all stages of organic production; farms are not hereditary, hence the lack of knowledge passed down from generation to generation. It is necessary to create an educational platform based on scientific approaches and international standards, accessible to manufacturers (multimedia educational materials of small size, special guides to help make informed decisions).

There are at least two positive consequences of the development of organic agriculture in the context of increasing the resilience of rural areas in Russia: 1) the involvement in the circulation of lands that are not of interest to large industrial producers, the creation of jobs in remote rural areas and the preservation of the cultural landscape of rural areas; 2) creation of competitive advantages for small farms that can enter the market, bypassing the struggle with large holdings. Strict organic farming standards provide for minimization of greenhouse gas emissions, which will contribute to the achievement of Russia's low-carbon development goals. In addition, organic farming creates a demand for innovations related to the biologization of production. Entomophage factories appeared in the country; there is a scientific industry for creating biological products to which pests do not adapt; multi-field crop rotations have been developed with a precisely calculated balance of nutrients and the preservation of the living matter of the soil. These moves towards cleaner technologies lead to mitigation of the impact of agriculture on the environment and, indirectly, on the climate.

4 Conclusions

There are serious contradictions between countries in assessing the green economy strategy: the attitude varies from complete approval to sharply negative, due to differences in understanding the purpose of the green economy, the level and characteristics of development, as well as the interests of states. Russia has enormous potential to reduce greenhouse gas emissions and increase carbon sequestration. The national goal of carbon neutrality no later than 2060 can be achieved in a cost-effective way, with most of the measures to decarbonize the economy can be implemented before 2050. transport, the chemical industry, and forestry, with the introduction of modern climate-oriented practices, can significantly increase carbon sequestration by 2050. Realization of the potential in the field of energy efficiency, development of carbon-free energy, production of green hydrogen and second and third generation biofuels, phased replacement of obsolete technologies to new, environmentally friendly ones, will reduce the total costs of the transition to a low-carbon economic model to 1% of GDP per year, fulfill Russia's obligations under the Paris Agreement, and avoid unreasonable losses from transboundary carbon natural regulation and divestment from carbon-intensive assets. Along with achieving climate goals, the transition to low-carbon energy technologies will increase energy security and technological independence, as well as reduce negative effects on the health and quality of life of citizens.

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