Aleksandr V. Evseev¹, Tatiana M. Krasovskaya^{1*}, Aleksey A. Medvedkov¹ ¹Lomonosov Moscow State University, Faculty of Geography; Leninskie gory, 1, 1199911 Moscow, Russia

*Corresponding author; e-mail: krasovsktex@yandex.ru

"GREEN" DEVELOPMENT OF THE UGRA TERRITORY: OPTIONS AND OBSTACLES

ABSTRACT. Sharp differences in natural environment and resources and demographic and economic characteristics in Russia place special importance on analysis of regional models of transition to "green economy." Regional model of transition to "green economy" for the Khanty-Mansi Autonomous Okrug-Ugra is discussed. This region is situated in Siberia and is leading in hydrocarbons extraction (57% of the country's total). The existing nature management pattern is closely connected with poor modern ecological situation. System analysis of preconditions for the transition of the Khanty-Mansi Autonomous Okrug-Ugra to green economy is presented. It includes description of limiting and promoting natural and social-economic factors and consideration of the ecological situation. Economic, institutional, and nature management tools for regional transition to "green economy" and sustainable development are demonstrated. These tools reflect regional pattern of "green economy" movement, though common mechanisms play the leading role (e.g., energy efficiency, climatically neutral production, environmental accounting, etc.). Regional pattern includes specific measures for forests preservation, ethnic-culture tourism development, organic agriculture based on reindeer meet, wild berries and mushrooms production, etc.

KEY WORDS: sustainable development, green economy, Ugra, system analysis

CITATION: Evseev A.V., Krasovskaya T.M., Medvedkov A.A. (2017) "Green" development of the Ugra territory: options and obstacles. Geography, Environment, Sustainability (GES Journal), Vol.10, No 2, p 94-102 DOI-10.24057/2071-9388-2017-10-2-94-102

INTRODUCTION

Global economic crises along with increasing anthropogenic environmental impact, population growth, climatic change, etc., promoted the "green economy" development model to mitigate these negative processes. International community adopted several fostering documents important the transition to "green economy." Among them are the European program "20:20:20" directed at industry and power production "greening," the UNEP "Green Course," the "Rio+20" Declaration, etc. According to these documents, the main target of "green

economy" is stabilization of economy development based on harmonization of "nature-population-economy" interrelations. Nowadays, positive achievements promotion of green economy goals may be already found in post-industrial states (Germany, Scandinavian countries, etc.). The "green economy" concept for Russia is relatively new and this term is not used in official documents. Nevertheless, Russia's future development programs for the next 10-20 year period correspond to the "green economy" goals. It is obvious that mechanisms of transition to "green economy" will differ from state to state

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and even at a regional level in connection with environmental and socio-economic situation. Sharp differences in natural environment and resources, demographic and economic characteristics in Russia place special importance on analysis of regional models of transition to "green economy." Its urgency is demonstrated by several regions of Russia. Among them is the Khanty-Mansi Autonomous Okrug-Ugra which has launched this process by developing a special program. Integrated assessment of preconditions for further green development were included into this program.

MATERIALS AND METHODS

The Khanty-Mansi Autonomous Okrug (region)-Ugra is one of the leading Siberian regions in economic development based mainly on hydrocarbons extraction (57% from the country's total) (Fig.1).

Priority given to the industrial land management model since 1964 has caused negative environmental changes promoted by the present-day climatic change. In 2016, the total volume of extracted oil fell from 46% of the total production in Russia to 43.9%. Continuous deterioration of resource quality and economic factors are responsible for decrease of the current oil extraction levels.

The existing nature management pattern is closely connected with modern ecological situation. The following ecological problems are typical:

- environment pollution, including uncontrolled accumulation of solid waste as the most urgent environmental problem;
- ecosystem mechanical disturbances connected with hydrocarbon extraction development; and

• degradation of reindeer pastures leading to aborigine population existence problems.

Hydrocarbon extraction is associated with poor air quality in locations near oil wells. 93.6% of air-born pollutants are gasses (CO, NOx, SO2, formaldehyde, benzo[a]pyrene, etc.) and 6.4% are solid particles. The air-born pollutants load is 4.5 t/km2 [State Report..., 2015]. Pollution of surface and underground water systems is significant. Very acute problems are connected with accidents on pipe-lines and soils re-cultivation in heavily polluted areas. A separate ecological problem is industrial and communal wastes management. More than 100 landfills exist nowadays and more than half of them are uncontrolled [State Report..., 2015].



Fig.1. The Khanty-Mansi Autonomous Okrug.

There are several specific "northern" risks connected with environmental factors. These risks include cryological, exogenic geological, and hydro meteorological. Among them are thermokarst effects, solifluction, landslides and avalanches in mountains (Berezovsky district) and from steep river banks, mudflows, erosion, floods, etc.

We used system analysis for studies of preconditions of the Khanty-Mansi Okrug -Ugra transition to "green economy." It enabled processing various data: environmental, social, economic, etc., for determining their links to development of "green economy." Regional statistics, economic and environment reports, field data received during earlier studies, published data, etc., were used in our investigation.

RESULTS AND DISCUSSION

Ambitious plans for future development announced by the local administration are connected with the transition to the "green economy" model and the creation of "Clean Ugra" brand. UN experts mark five vital for "green economy" sectors: energy supply, transition to renewable energy sources, waste processing, organic agriculture, environmentfriendly transport, and rational water resources use. Nowadays, Ugra's economic development is based on limited options of natural capital exploitation. Renewable energy sources, biological resources (timber, hunting and fishing etc.), and recreational resources are used inadequately but provide preconditions for economy diversification important for the transition to "green economy."



Fig. 2. Prevailing wind directions, pollutants transit routes, and environmental hot-spots.

1- Yamalo-Nenets Okrug, 2 Sverdlovskaya oblast, 2a- Tyumenskaya oblast, 3- Chelyabinskaya oblast, 4- Kurganskaya oblast, 5- Ugra.

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Possibility of economy "greening" for the sake of sustainable development of any territory is provided by combination of different factors, both natural and social-economic. Climate change influences the global ecosystem processes thus involving social-economic changes. Globalization processes promote shift of "dirty" industries to developing countries, etc. The transition to "green economy" in Ugra meets various obstacles and options both limiting and promoting this process.

Limiting factors

Two blocks of limiting factors by origin exist in Ugra: natural and social-economic. Geographical position which influences



Fig.3. Land-slides and avalanches activity [Atlas..., 2004].

ecosystems stability in impact regions and ecological situation in general is the first to be regarded. Main natural limiting factors are connected with the Ugra geographical position promoting development of the following limiting factors: long cold winters demanding additional energy supply accompanied by negative ecological effects, unfavorable weather conditions, etc., slow biogeochemical turn-over(plant debris decomposition takes up to 20 years) and thus limited ecosystems self-purification capacity. promoting environmental pollutants accumulation in ecosystems, high percentage of bogged territories, relatively low biological productivity; long-range air pollutants transport from the Southern Ural and other neighbor industrial regions, water pollutants transported by transit river flow, etc. (Fig. 2). The list of environmental hot-spots compiled recently in the Ural Federative Okrug, where Ugra is located, includes about 50 sources of air-born and water pollutants [Report..., 2008].

Geomorphologic factors – land-slides and avalanches activities (Fig.3) and flooding of the Ob lowlands – must be also regarded as limiting factors. Patterns of atmosphere circulation produce high percentage of stills (20-30%) and heightened occurrence of airborn pollutants accumulation.

Nowadays, climate change represents an additional risk for "green economy" development. According to modern forecast data [Atlas..., 2004], two scenarios of temperature change (≈0.50C) exist for the region. According to V. Bysheva et al [2011], rise in annual average temperatures is forecasted for the middle of the 21st century. Decrease in relative air humidity will promote forest fire frequency. Permafrost thawing and solifluction will accelerate [Medvedkov, 2015]. Outbreaks of plant diseases, worsening sanitary-hygienic conditions due to permafrost thawing, and increase of areas of transmissible diseases such as malaria will accompany climatic warming. Positive changes are connected with higher biological productivity and turn-over, earlier and longer warm period, and more favorable living conditions. The opposite scenario (fall in temperature) development will promote increase of areas under permafrost in several parts of the region [Atlas..., 2004], continues pollutants accumulation in ecosystems, etc. But this scenario is less probable according to recent monitoring data.

Social-economic factors include history of industrial development, relatively recent introduction of ecological standards and inadequate system of pollution control during a long period of time. More than 50-year practice of hydrocarbons extraction started long before the development of important environmental protection standards, which became very actively used only by the end of the 20th century. Ecosystem losses is still occurring. The present-day role of Ugra as one of the state's leaders in economic development promotes further industrial nature management, though ecosystem losses reduce the regional GDP to a high extent: genuine domestic savings index is minus 45.69 [Bobylev et al., 2012]. Thus, Ugra permanently reduces its natural capital and increases rate of ecological degradation; however it promotes economic development of other regions (being an economic donorregion) providing "consumer surplus" free of charge for them as far as environmentforming ecosystem services are concerned.

Promoting factors

Promoting factors are connected with large territories with minor technogenic impact and high share of forested (taiga) territories - more than 50% of which form ecological buffer zones mitigating negative anthropogenic impact. The history of nature conservation activities started in 1929 when the first nature reserve Sos'vinsky was founded. Nowadavs, there are 24 natural protected territories which make 5.2% of the total Ugra area. Ecosystem structure of licensed oil extraction territories includes 40% of forested lands and 48% of bogged territories which may serve as carbon sequesters thus providing an important ecosystem service (GHG reduction) as well as filters for polluted air and run-off. Ecological buffer zones of nature protected territories may be enlarged by territories with traditional nature management of Khanty, Mansi and Nenets, occupying over 33% of the



Fig.4 Gross regional product per capita (2014) – Ugra's position (based on: PlatonPskov [2014].

total area, but nearly 40% of them are in the licensed oil production sites, which demand special measures for their protection.

Favorable factors also include very high values of regional GDP compared to other regions of Russia (Fig. 4), more than 90% of economically active population, higher expenditures for technological innovations than in Russia, etc.

Options

Nowadays, many countries moving towards "green economy" take active measures to develop its brand based on sets of different tools corresponding to existing options. Analysis of preconditions for the Ugra's economy "greening" allowed outlining competitive advantages stipulating options for the "Clean Ugra" brand formation.

Renewable natural resources advantages. This region possesses high biological and recreational potential which may benefit economy diversification. Economic diversification based of renewable nature capital may provide favorable positions for Ugra in the on-going process of development of the world and regional ecosystem services markets. With the decreasing role of hydrocarbons fuel in future this, may bring good dividends to the Ugra sustainable socioeconomic development.

The Ugra renewable energy sources potential is not very high, but still significant for exploitation. For example, wind energy potential is high in Beloyarsky and Berezovsky districts where the VAWT type of windmills



Fig.5 Options for the creation of the "Green Ugra" brand.

may de efficient. Solar energy resources assessed for optimal direction of solar batteries in the Kondinsky and the Surgutsky districts are comparable with that in the Rostov region in the steppe zone of Russia. High hydro energy potential is typical of small rivers in the Berezovsky district. Large amount of waste products in timber producing regions as well as agricultural waste products form a reliable source for biofuels production.

Socio-economic advantages. Having a relatively high level of economic development compared to other regions of Russia, Ugra has financial resources for investments in sustainable nature management, technological modernization, population ecological education, etc., for the sake of nature capital preserving and adequate exploitation.

Social competitive advantages are contributed to large investments in human capital development. Ugra is an attractive region for migration despite severe climate. A well educated population in professional and ecological spheres may be considered the leading social factor for sustainable development. Traditional ecological ethnic culture of indigenous population may help to find safe methods for modern ecosystems exploitation.

Fig. 5 shows the existing options for the creation of "Green Ugra" brand. They include economic, nature management, and institutional measures. Each option includes a set of tools directed at economic "greening" (Fig. 6, a-c)



(c)

Fig. 6. a) Economic tools; b) Nature management tools; c) Institutional tools of economic "greening"

These tools reflect regional pattern of "green economy" movement, though common measures play the leading role (e.g., energy efficiency, climatically neutral production, ecological accounting, etc.). Regional pattern includes specific measures for forests preservation, ethnic-culture tourism development, organic agriculture based on reindeer meet, wild berries and mushrooms production, etc.

CONCLUSIONS

The administration of Ugra is now developing a special program directed at "Green Ugra" brand. Special attention is given to "green" technologies, proper industrial and communal wastes management, and nature conservation. Ugra has all chances to be the first resources exploitation region in Russia that actively promotes the transition to "green economy" and sustainable development despite economic and environmental obstacles.

ACKNOWLEDGEMENTS

This work was financially supported by the Russian Foundation for Basic Research, grant N 15-06-02279.

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Received on February 20th, 2017

Accepted on May 12th, 2017

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Alexander V. Evseev is Doctor of Science, Leading Researcher of the Faculty of Geography, Lomonosov Moscow State University. He has long experience in field research in the Arctic, Siberia, and the Far East. He participated in the development of pollution monitoring system in the Arctic zone. The scope of his research interest includes pollution monitoring, sustainable nature management, urban ecology, and paleopedology. He is Expert Ecologist of the Arctic Department of the RF Ministry of Economy, Russian Scientific Foundation, etc.



Tatiana M. Krasovskaya is Doctor of Science, Professor of the Faculty of Geography, Lomonosov Moscow State University. She has long experience in the Arctic field research. The scope of research interest includes nature management, geoecology of northern territories and urban systems, and ethic-cultural aspects of sustainable development. She is the leader of the interdisciplinary seminar "Cultural Landscapes" of the Russian Geographical Society.



Aleksey A. Medvedkov is Ph.D of Geography, Senior Researcher of the Faculty of Geography, Lomonosov Moscow State University. He has long experience in field research in Siberia. He is the winner of competitions for the grants of the President of Russia for state support of young Russian scientists and the recipient of the IGBP diploma for his results in competition «Global changes of the environment». He is a member of the IGU Commission on Cold Regions Environment. Areas of scientific interests: modern landscapes of permafrost zone, life support systems, resource assessment of landscapes, natural disasters and changing climate, ecological and geographical problems of new development areas, environmental geoconflictology.