

COMPARATIVE ANALYSIS AND PROSPECTS OF ECOLOGICAL AGRICULTURE DEVELOPMENT IN THE REGIONS OF ALTAI AND HIMALAYAS

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ABSTRACT

The paper presents the results of the comparative analysis, research, resource potential of the Big Altai territory and the Altai - the Himalaya which show that the natural environment of these areas, including the highlands of the Great Himalaya in India with highland meadows is unique to the development of ecological agriculture. The results of laboratory studies on quality of meat of animals of the border regions of Russian Altai and Mongolia are evidences of ecological transparency and nutritional value of meat and appropriateness of its inclusion in diet and dietary therapeutic nutrition. In the future - access to world markets will contribute to the economic growth and development of rural areas. It is proved that the organically oriented agricultural production becomes more efficient in terms of interaction and cooperation, combining research scientists from Russia, Mongolia and India in developing joint projects. It sets out the conceptual basis for the creation of ecological oases and micro-ecocluster in these areas. Prospects for the development of rural areas are not only linked to agricultural production and related diversification, but also for non-agricultural employment. In this regard, relevant government support of entrepreneurship, promote the construction of modern housing, development of rural infrastructure and energy supply. With the help of integrated approach these can achieve significant synergies and improve the efficiency of state support.

INTRODUCTION

The demand for environmentally clean and safe products is increasing in the world and this involves ecologically safe production and environmental conditions. At the same time, according to the United Nations (UN) data, at present there is an increasing demand for depleting natural resources, and the world population tends to grow from 7 to 9 billion already by 2050 [1].

It follows from the World Wildlife Fund report that the global biodiversity has declined by 30% from 1970 to 2008, the level of natural resource consumption has doubled since 1966 up to present, and the damage caused to the environment by human activities in the countries with high-income more than 5 times exceeds that of the low-income countries. The priority is given to the consumption by the world population and the production of life-supporting ecologically clean food which is safe for human health and the environment. According to the World Health Organization (WHO), every year up to 30% of the developed countries' population suffer from the diseases associated with poor nutrition.

The above problems are the potential risks and require immediate action, the development of effective long-term strategy for the development of society and nature. Such strategy is a concept of sustainable development which implies the equivalence of three main components – economic, social and environmental component referred to as “green” economy based on organic farming.

The world market of organic products is growing by 20% per year since the early 1990s, and as projected by many Western experts, the mankind is on the threshold of organic product boom, and organic production will increase rapidly next ten years – by about 50% per annum. Currently, organic product sales in the United States grow by 17-20% a year while the sales of conventional food in the recent years increase on average by about 2-3% a year only. In Canada, from 2006 to 2012 the average growth rate of organic product sales made 26% a year [2].

In the European Union, approximately 3.9% of total agricultural land is used for organic production. The countries with a traditionally large percentage of organic farming are Liechtenstein (26.9%), Austria (18.5%), Sweden (12.6%) and Italy (8.4), followed by Czech Republic and Greece (7.2% each). In the Russian Federation, in 2012, this percentage grew by 25-30% – to \$100 million. According to the experts of “Ekoklaster” Association, in 2011 the figure was about 60 million dollars.

The experts point out that about 5-10% of the country’s citizens are ready to regularly consume organic food products, which is quite a large number even by the standards of the Western countries. According to various expert estimates, 5% of Russian citizens regularly consume organic products at present. Another 3% would like to consume it but cannot due to insufficient income or unavailability of such products [3].

The leading countries in terms of organic food production are the United States (26.8 billion), Germany (7.9 billion), and France (4.5 billion) [2]. According to the data of the Research Institute of Organic Agriculture (FiBL) (Germany) for 2011, the areas under organic farming in Russia changed as following: in 2005 – 4049 ha, 2006 – 3192 ha, 2007 – 33801 ha, 2008 - 46962 ha, 2009 – 78449 ha (0.047% of all agricultural lands) [3].

At the same time, some experts point out that organic production in a number of EU Member States has reached its limits as evidenced by supply shortage of many organic products (for instance, Germany imports wheat, maize, rice, grain legumes, oilseeds, vegetables, fruits, potatoes and, to a lesser extent, animal products).

The researchers of the problems of mountain regions of the Great Altai and Himalayas emphasize the strategic importance of these unique cultural and biosphere regions for spiritual and environmental breakthrough in the development of society. It is in these regions where significant areas of pristine nature, biological diversity and cultural heritage of many nations are preserved. Such regions are not only environmental donors for their countries, but also for the whole world, owing to a huge potential of ecosystem services and prospects for the production of agricultural and pharmaceutical goods [4, 5].

The results of comparative analysis and research of the resource potential of the areas of the Great Altai and the Himalayas show that the natural conditions of these areas, including the highlands of the Great Himalayas in India, with a typical “kingdom” of alpine meadows and diverse vegetation are unique for organic farming. Four main directions of its development are specified:

- ecology of production (stage-by-stage reduction of the impact on the environment; alternative energy supply);

- human ecology (creation of ecologically safe and comfortable living environment of the population, places of work and recreation and other social activities);
- ecological agro-industry (the development of organic farming and processing of its products which will significantly reduce the problems of employment, rural poverty, and improve the quality of life of rural population while preserving the environment);
- ecology of natural environment (conservation and protection of natural environment, creation of sea-buckthorn plantations and shelterbelts, water systems, pasture improvement based on ecosystem-based management and construction taking into account environmental restraints).

RESULTS AND DISCUSSION

Ecologically safe human living conditions and the possibilities of ecological production depend primarily on the state of the environment. The studies of the catchment areas of the Great Altai's rivers [6] showed mostly favorable ecological condition of the river basins (Fig. 1, 2).

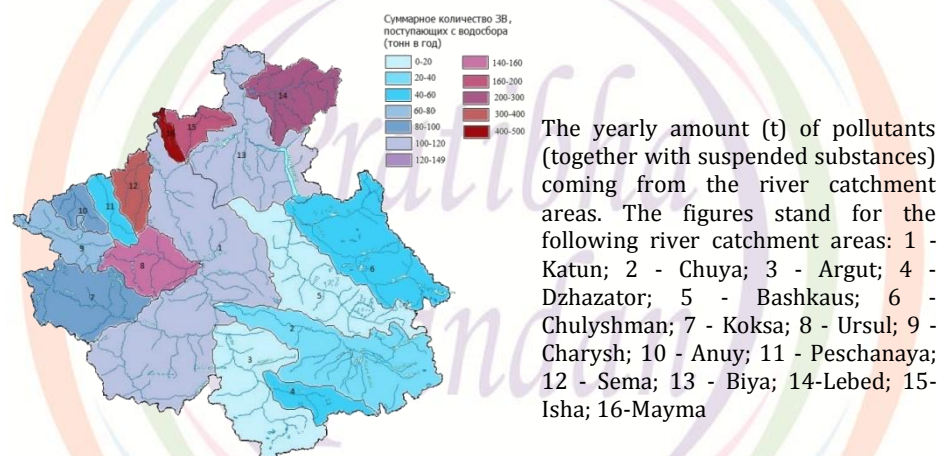


Fig. 1: Total amount of pollutants the catchment areas of the Great Altai's rivers

The studies of the resource potential of the Great Altai areas were jointly carried out with the colleagues of the Zavkhan and Khovd Universities (Mongolia) and the Gorno-Altai State University (Russia).

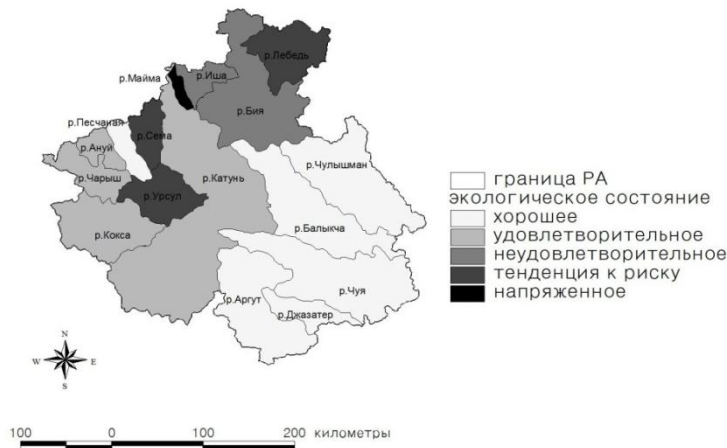


Fig. 2: The ecological state of the river catchment areas of the Great Altai

The purity of air basin is supported by highland areas, biodiversity of unique vegetation, and the absence of polluting industries (Image 1).

The economy of the areas is determined to a greater extent by their location, natural and climatic conditions, and resource potential. The climate is continental, with considerable temperature variations throughout a year (from +40 degrees in summer to -45 degrees in winter) along with daily variation (sometimes daily temperature fluctuations amount to 30 degrees). The air is dry and relative humidity is 20-30%. The number of sunny days is more than 300 days a year.



We conducted a laboratory study of the quality of farm products manufactured in these regions, in particular, meat of farm animals from the cross-border territories of Mongolia and Russia. Biochemical tests and veterinary-sanitary examination performed the State Organization “Central Research and Production Veterinary Radiology Laboratory” in order to determine ecological purity and nutritional value of beef produced on the farms of the Republic of Altai, Altai Region and Western Mongolia revealed its ecological safety and high content of useful

micro- and macronutrients, vitamins, and favorable acid composition. However, the development of organic farming, particularly in Mongolia, requires solving the major problems of animal forage availability, especially in winter, and veterinary service, since the animal industry suffers heavy losses: cattle mortality reaches 18.5%, and that of goats – up to 49% [7, 9].

First of all, pastures should be improved alongside with the preservation of organic agriculture. These technologies were developed and tested in Russia in the high mountains of the Altai mountain system. It has been proved that organically oriented farm production becomes more efficient in the setting of interaction and

cooperation, and combining the resource potentials of Russian and Mongolian trans-boundary areas [8, 9]. To implement this project, it will be required to establish selective breeding, pedigree, information and counselling centers, to form ecosystem-based management, and to adapt its mechanisms and structure to the specifics of the resource potential of the ecosystems of individual regions.

The ecosystem-based approach is considered as a methodological foundation for many areas of science and practice of the near future as it provides the ability to predict not only the direct but also indirect consequences of human impact on natural objects as well as to retrospectively simulate the genesis of these objects with all their relations. Ecosystem-based management is one of the pervasive thematic priorities of the United Nations Environment Programme activities (UNEP) which include: climate change; disasters and conflicts; ecosystem management; environmental governance; harmful substances and hazardous waste; resource efficiency – sustainable consumption and production [10, 11].

Different sectors of society view ecosystems in terms of their own economic, cultural and social needs. Indigenous peoples and other local communities living by means of natural resources are important stakeholders and their rights and interests should be recognized. One of the priorities of the ecosystem approach is to maintain the structure and functions of ecosystem in order to maintain ecosystem services.

Based on the study of cooperation state in the Altai Region, we have proposed new scientific approaches to cooperation development in rural areas within cluster structures [12]. Economic feasibility of cluster formation for manufacturing ecologically pure animal products in the cross-border areas of Russia and Mongolia has been substantiated. Organizational structure of a cluster association and its functioning mechanisms, the prospects for the development of organic animal production in the cross-border areas of Altai have been developed [13]. It has been proved that significant synergetic effects may be achieved and state support efficiency improved by means of integrated approaches.

Economy clusterization enables to implement integrated approach to regional development. The economic entities, having associated in a cluster, have the opportunities for sustainable expansion organic production due to attracting investments and highly qualified specialists, to be consulted on marketing, innovative technologies, economics and organization of production, logistics and other issues. Small businesses and household farms get possibilities for development. This contributes to solving the problems of rural employment, rural development, rational and efficient use of the resource potential, and environmental conservation.

The management company formed to coordinate the activities of the cluster members is the executive body of the cluster council. It seems appropriate that the management company of the eco-cluster interacts with the Agricultural University on the development of normative and technical documentation on new products, technical regulations, certification according to GMP standards, marketing and training specialist of required qualifications. In general, the formation of the eco-cluster involves cross-border scientific and economic cooperation.

The following necessary conditions for these processes have been defined:

- the development of ecosystem-based management;
- the priority of public investments and expenditures promoting the transition of economy sectors and commodity producers to the “green” category;
- expenditure restraints in the industries that deplete the natural capital;
- the application of taxes and market-based tools to change the preferences of producers and consumers, promote “green” investments and innovations;
- investing in skill improvement, research and education;
- strengthening of international cooperation.

The role of the state in the development of organic farming is important. Many countries have their own systems of state support of environmentally-oriented farm enterprises. For example, during two-year period of an organic farm development, German farmers receive support from several funding agencies of the EU Governments and their federal lands for a total amount of €200-400 per 1 ha of agricultural land. In two years, the support amount is reduced to €100-200 per 1 ha. This level of support is significant enough: state subsidies and grants make up to 40% of the gross income of an organic farm in Germany. However, the mechanisms for public subsidies receipt vary – in some countries subsidies and grants are allocated during the transition to environmentally-oriented farm production (France, Great Britain, Greece, Germany), while in most countries the government support in the form of grants and subsidies is mainly allocated to the farms which made the transition to green production [14, 15, 16].

The government should support the establishment of the agencies for ecological monitoring, environmental consulting, research and innovation eco-centers, associations, non-profit ecological unions, and implementation of social programs of environmental development of rural areas.

The document which regulates the approach to a voluntary environmental certification to meet the requirements at all stages of organic production cycle (services, works) is the standard ISO 14024 “Environmental labels and declarations – Guiding principles”, and its Russian analogue – GOST R ISO 14024 “Environmental labels and declarations. Type I environmental labeling. Principles and Procedures” [17, 18].

The standard specifies the requirements for the following indices:

- environmental contaminant content in certified objects – organic farm products;
- environmental pollution level;
- level of environmental safety for human health and farm animals;
- reuse of organic components (closed production cycle);
- rational use of natural resources in organic production; land resources in particular;
- use of renewable resources;
- levels of wastes and emissions;
- environmental indices of organic product transportation;
- environmental indicators of waste management in organic production;
- use of innovative alternative farming technologies in organic production.

The System of International Standards reflects the current level of organic production and specifies the requirements for the production, processing and storage of organic products. At present, much attention is paid to organic product labeling. The international certification system has adopted product labeling according to the environmental standards of ISO 14000 family (Table 1) [19].

Table 1. Environmental labeling according to ISO 14000 standard families

Documents	Content
ISO 14020 Environmental labels and declarations - General Principles	According to this Standard, the goal of environmental labels and declarations is to inform the consumer of reliable information on the environmental characteristics of a product or service; this contributes to the expansion of organic product markets and reduction of negative impacts on the environment
ISO 14021 Environmental labels and declarations	The Standard specifies the requirements for environmental claims in the form of verbal statements, symbols, and graphical presentations relating to organic products, it contains common methods of assessment and verification of self-declared environmental claims
ISO 14024 Environmental labels and declarations. Type I environmental labeling. Principles and Procedures	Environmental labeling program is dealt with; environmental labels are awarded to the products which conform to specific requirements. The label identifies the product that is preferred because of its ecological properties within a group of similar products

The purpose of environmental labeling is to draw customers' attention to safe products. The application of the standards ISO 14000 R (adopted by the Russian State Committee for Standardization and Metrology) by enterprises, the passage of environmental auditing and certification procedures is determines the receipt of certain benefits, opportunities, and achievement of additional economic benefits. At the state level, labeling may be carried out by the Ministry of Economic Development, Committee for Standardization and Metrology, and Ministry of Finance of the Russian Federation. At the industry level, the management of farm "greening" process and organic product quality control is carried out by the Ministry of Agriculture. At the level of farm enterprise focused on organic production, "greening" process management and organic product quality control is carried out by respective agencies: the departments of agronomy, veterinary medicine, engineering, finance and economy, etc. In conclusion, it should be noted that organic farm products are manufactured by certified farms only; soil and drinking water for poultry and livestock and the product itself should confirm their certifications biennially.

Significant synergetic effects may be achieved and state support efficiency improved by means of integrated approaches. When this approach is applied wider, joint action in the regions and regional development strategy may be supported more intensively; private resources and potentials of endogenous development may intensify. The proof is the activities of the German associations in the production of ecologically pure products, in particular, of the well-known organic-food association Biolande. V. [20, 21, 22].

Clear objectives are developed in the concept of regional development taking into account the involvement of important regional representatives; the criteria for operational success are defined. Taking into consideration of mostly family pattern of livestock breeding in the mountain regions of the Great Altai and the Himalayas, its co-operation in terms of cross-border interaction may have significant economic multiplier effect. Ecological (biological or organic) farming aimed at the preservation of the natural foundations of life, natural processes and obtaining organic (environmentally pure) products is a promising form of economic activity in these regions.

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