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# An Ecosystem Approach to Balanced Territorial Development

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## ABSTRACT

**Relevance.** The problems of sustainable development of rural areas are extremely relevant nowadays, especially in the context of deepening localization and the increasing role of territorial and natural resources.

**Research objective.** The purpose of the article is to develop theoretical and methodological aspects of sustainable development of territories, encompassing rural areas with small urban settlements, based on the ecosystem approach to form a unified multi-level strategy for the development thereof.

**Method and data.** The paper substantiates an application of the ecosystem approach to the development of rural areas in increasing the efficiency of rural businesses, budgetary spending through prioritization of state support recipients, stimulating sustainable development of enterprises and the industry, and increasing the consistency of regional economic policy. The conceptual foundations of this approach are presented, and an algorithm to select participants in a rural ecosystem is proposed.

**Results.** The proposed approach allows operationalizing self-organization processes in an ecosystem, ensuring a balance of interaction processes of its participants. The research results have contributed to solving the problem of territorial socio-economic ecosystem formation by proposing an algorithm to select target indicators for achieving sustainable development goals, taking into account the specifics and development trends of territories.

**Conclusions.** The conclusions arising from the conducted research provide scientists, government bodies with the necessary information for a better understanding of practical mechanisms to provide balanced territorial development, ensure the move from fragmentary unsystematic measures of state support to effective differentiated and targeted regional policy of rural areas.

**Keywords:** sustainable development; rural areas; small territories; spatial regional policy; strategy; territorial development; rural ecosystem; cluster

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## Экосистемный подход к сбалансированному территориальному развитию

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## РЕФЕРАТ

**Актуальность.** Проблема сбалансированного и устойчивого развития сельских территорий чрезвычайно актуальна в настоящее время, особенно в условиях углубления локализации и возрастания роли природно-ресурсных факторов.

**Цель исследования.** Целью статьи является разработка теоретико-методологических аспектов устойчивого развития территорий на основе экосистемного подхода для формирования единой многоуровневой стратегии их развития.

**Данные и методы.** В статье обосновано применение экосистемного подхода к развитию сельских территорий с малыми городскими поселениями для повышения эффек-

тивности сельского бизнеса, оптимизации расходования бюджетных средств за счет приоритизации получателей государственной поддержки, стимулирования устойчивого развития предприятий и отрасли, повышения согласованности региональной экономической политики. Представлены концептуальные основы этого подхода и предложен алгоритм выбора участников сельской экосистемы.

**Результаты.** Предложенный подход позволяет операционализировать процессы самоорганизации в экосистеме, обеспечить сбалансированность процессов взаимодействия ее участников. Результаты исследования вносят определенный вклад в решение проблемы формирования территориальной социально-экономической экосистемы посредством разработки алгоритма выбора целевых показателей достижения целей устойчивого развития с учетом специфики и тенденций развития территорий.

**Выводы.** Выводы, вытекающие из проведенного исследования, предоставляют ученым и государственным органам необходимую информацию для лучшего понимания практических механизмов и инструментов обеспечения сбалансированного развития территорий, обеспечения перехода от фрагментарных бессистемных мер государственной поддержки к эффективной дифференцированной и адресной региональной политике.

*Ключевые слова:* устойчивое развитие, сельские районы, малые территории, пространственная региональная политика, стратегия, территориальное развитие, сельская экосистема, кластер

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## Introduction

Russia is characterized by a significant differentiation of the socio-economic space due to the heterogeneity of the territory, and the peculiarities of the distribution of the population, resources and industries. Under these conditions, there is further polarization of the economic space being manifested in the accelerated growth of large urban agglomerations as centers of concentration of population and production, and, conversely, in the crisis state of small territories. The latter are characterized by depressive development including depopulation due to natural decline and migration outflow, high unemployment, monoprofile, etc. Therefore, when developing a policy aimed at improving the balance of the economic space, it is necessary to take into account the characteristics of various territories, including small (rural areas, small urban settlements, and small cities) ones. The conceptual definition of small regional territories might vary for each country [27]. In this article, they are specified as settlements, located in small urban regions and normally surrounded by rural areas.

The level of the quality of life of citizens in rural areas, being predominant on the territory of the Russian Federation, should be considered as an important criterion for the development of the economic space.

The debate about urban-rural disparities in living conditions is very broad. Many studies have concentrated particularly on inequalities and disadvantages resulting from the residential environment with focus on rural areas and rural-urban disparities [18; 22; 42]. Uneven development between urban and rural areas can lead to social unrest and uncontrolled mass-migration affecting the more developed urban areas [27].

There is a number of approaches to understanding the specifics of the quality of life in rural areas, including such aspects as social inequality caused by the gap between large metropolitan and rural, depopulated places, as well as other factors reducing the attractiveness of rural life [16; 18; 25; 42]. The so-called “rural effect” implies that rural life is an independent factor to reduce the level of well-being of the population [16]. In our opinion, it is inappropriate to consider this state of affairs as an independent factor that cannot be changed.

In Russia, this discussion was initiated, first of all, by various researchers who studied the inner periphery [1; 8; 9; 23; 41]. They highlighted that there were disadvantaged, predominantly rural areas, whose residents suffered from a limited job supply, dilapidated public infrastructure and limited transportation, which led to a decrease in the quality of life.

There is a view that the differences between urban, regional and rural development may decrease over time due to the focus on sustainable development problems, as “rural areas have become bound into urban and regional development patterns in new ways” [27]. Today, sustainable development of rural areas is based on the concept of sustainable development — Our Common Future — the report of the World Commission on Environment and Development, presented in 1987 and better known as the Brundtland Report (BR). Rural territories, due to their predominance in the territories of the Russian Federation, are the country’s most important resource.

In the international theory and practice, it is argued that fostering a competitive agricultural sector can contribute significantly to the achievement of Sustainable Development Goals (SDGs). For example, the focus of the European Union rural development policy is to actively support multifunctional agriculture, accompanied by a low reflection of non-agricultural activities by strengthening the social, environmental and economic sustainability of rural areas [28; 30; 32]. Environmental protection, conservation and effective development of lands suitable for agricultural activities, infrastructure development, etc. are among the priority issues for authorities and local self-government bodies. In fact, it is industrial and social development of territories, and, ultimately, improvement of the quality of life of citizens.

The Russia’s agriculture is on the rise with a positive dynamics of export-import turnover [12]. Despite the dynamic growth of the agro-industrial complex as a whole in the country, the quality of life of rural citizens lag significantly behind the large cities. The population’s access to the services of social organizations is narrowing, and the information and innovation gap between urban and rural areas is deepening, leading to an increase in the migration outflow of the rural population. Supporting the development of small territories is a promising area, since it provides new incentives for socio-economic revival, and inclusion in the country’s economic space.

Unfortunately, the Russian rurality is being rapidly emptied out. The number of rural areas is decreasing (19,416 settlements by now), and the number of extinct settlements is growing. Unemployment and poverty are concentrated in rural areas [9], and the standard of living of rural citizens is very low. Nowadays, it is the main reason for the outflow of population from rural communities to large cities. In this regard, the research into the problems of sustainable development of rural areas and search for ways to solve thereof remains an urgent task of the state at current stage of economic development.

In our opinion, the most adequate definition of a “rural territory (area)” was formulated as “...socio-economic, cultural and distinctive area of existence and life of the rural community, designated by the territory outside urbanized spaces, consisting of rural settlements with their social and production infrastructure, enterprises, and surrounding natural landscape and corresponding inter-settlement territories” [3]. The author suggests considering a small territory as a combination of six subsystems: economic, social, environmental, political, cultural, and informational. Balanced development within each subsystem leads to sustainable development of rural areas. Some researchers [6] identify the following factors for the development of small territories: increasing the attractiveness of activity of small forms of enterprise in the agro-industrial complex; developing social and transport infrastructure; creating consumer cooperatives; developing rural tourism.

It is obvious that a state social policy is needed in order to increase the economic efficiency and the quality of life in rural areas. This policy should be focused on the

following major guidelines: creation of a favorable social environment; increase in the material living standards up to the average urban; provision of population employment, its social activity and professional culture; restoration of spiritual values and the best traditions; increase in fertility [4].

The SDGs and indicators within the framework of the 2030 Agenda for Sustainable Development are reflected in the state policy of the Russian Federation, in particular in the provisions of the Decrees on national goals and strategic objectives for the development of the Russian Federation for the period up to 2024 and for the period up to 2030. Just prior to the adoption of the UN Agenda, the Strategy for the Sustainable Development of Rural Areas of the Russian Federation for the period up to 2030, partially addressing the issues regarding ensuring the quality of life of the population had been endorsed, and after that the State Program of the Agro-Industrial Complex of the Penza Region Development was approved.

Thus, today, the main goals of sustainable development of rural areas in Russia and the proposed measures to achieve thereof are only integrated into state strategic and program documents. At the same time, there is no consensus regarding the mechanism for setting goals for sustainable development of rural areas and methods of achieving thereof both at the level of the constituent entities of the Russian Federation and in the rural areas themselves.

In general, there are two main ways of development of rural settlements that can be used for sustainable development of the territory. Firstly, this is a sectoral approach, within which the basis for the development of rural areas is sustainable development of the agro-industrial complex and agriculture in general. Secondly, it is a territorial approach, when the comprehensive development of rural areas is required to restore a decent standard of living for rural residents, including the development of infrastructure in rural settlements [2].

Today, the sectoral approach prevails in the state socio-economic policy. Despite the fact that the territorial approach, being more complex but the most expedient, it is practically ignored in strategic documents. For example, Spatial Development Strategy of the Russian Federation for the period up to 2025, approved by the Order of the Russian Government dated February 13, 2019 N 207-R embraces measures specifically focused on cities that form large urban agglomerations. Nevertheless, there are no specific mentions of small territories which contemplate the need to devote resources to developing rural areas, by focusing on sustainable agriculture and rural infrastructure.

Small territories were out of strategy developers' view. On the one hand, there is an imbalance in development of small, medium and large towns, and, on the other hand, of the urban and rural system, and a continuous widening of the gap between a city and the countryside. The issues of "effective economic and social development of rural areas" were beyond the scope of the State Program for the Development of Agriculture [23].

It is necessary to fundamentally change the attitude towards the mission of rural areas in the country's economy. A number of documents provide industrial concentration in limited favorable zones, construction of multi-storey farms, thus ensuring competitiveness of agriculture, and accelerating production of synthetic food, especially livestock products. However, focusing on the maximum possible use of the country's richest land fund for the production of agricultural products and rural settlement should be considered the most appropriate solution [8; 41].

In Russian practice, the attempts have been made to solve the problem of increasing the production of agricultural products by creating holding companies with the involvement of farms in 5–7 administrative districts. Despite job creation and economic growth, this led to market monopolization, squeezing out smaller producers and depleting agricultural land. The uncontrolled monopolization of segments of the agro-industrial

complex by large agricultural holdings is accompanied by the washing out of small and medium-sized enterprises, which, in turn, creates structural constraints for the development of rural areas and dooms them to stagnation.

In our opinion, ensuring sustainable development of rural areas is impossible without the inclusion of all rural entities in this process. It should be realized the awareness to “shift resources from large commercial farmers to smaller non-commercial farmers and rural nonfarm households in general” [3]. Such an approach requires a comprehensive consideration of the totality of these entities as a unified system and the correlation of their goals and results of activities with the SDGs of the rural territory of their functioning. It will allow moving to a qualitatively new stage in the development of a territory in the interests of its residents.

In our view, this task can be solved using the ecosystem approach. In our opinion, an ecosystem is a new complex organizational and economic model for the development of a territory, based mainly on horizontal relations and connections. The key advantage of creating ecosystems is to ensure mutually beneficial cooperation and voluntary partnership of all rural stakeholders. The ecosystem approach allows one to get away from a rigid hierarchy, vertically integrated structures that have shown their unviability in the face of uncertainty and external shocks, including the pandemic crisis that has unfolded today. It is these vertically integrated structures in the form of agricultural holdings, which actually monopolized the agro-industrial complex in rural areas, that represent the main barrier that does not allow rural areas to develop sustainably.

The rest of the paper is organized as follows. In Section 2, we provide an overview of the current state and problems of rural development in Russia. Section 3 is devoted to the theoretical foundations of our research based on the authors' conceptual assumptions and chosen approaches. An ecosystem approach to sustainable development of rural areas is also considered in this Section. Section 4 presents a new algorithm for the selection of participants in the rural ecosystem. This algorithm includes the key assessment factors formed in accordance with the strategy of sustainable development of the territory in which the ecosystem functions, and the development strategy of the ecosystem itself. Section 5 focuses on the key research findings and presents the theoretical contribution and practical significance of the study. Future research perspectives are also proposed here.

## Theoretical framework

### *Current State and Development Problems of Rural Areas in Russia*

Consider the current state of sustainable development of rural areas in the Russian Federation. As of 2018, Russia ranked 16th among the world's leading countries with the largest rural population (Fig. 1).

At the same time, there are extremely pessimistic projections regarding the rural population decline in Russia: in 2050, it will be approximately 14.68 million less than in 2018 (Fig. 2).

As in 2015-2017, the negative natural increase was the main reason for the decline in the rural population in 2018. The second most important reason is the migration outflow, the third one is administrative-territorial transformations. In the period from 2019 to 2020, the rural population of Russia decreased by more than 0.7%

Significant peaks occurred in 1992 and 2004, when the rural population grew by 1.88 and 0.85 percent, respectively, partly due to a decline in the urban population.

In 2020, more than 14 deaths per one thousand population were recorded in Russian cities. In rural areas, the mortality rate was 15.4 deaths per thousand people in the same year. In both types of territories, an increase in mortality was observed over the past year (Fig. 3).

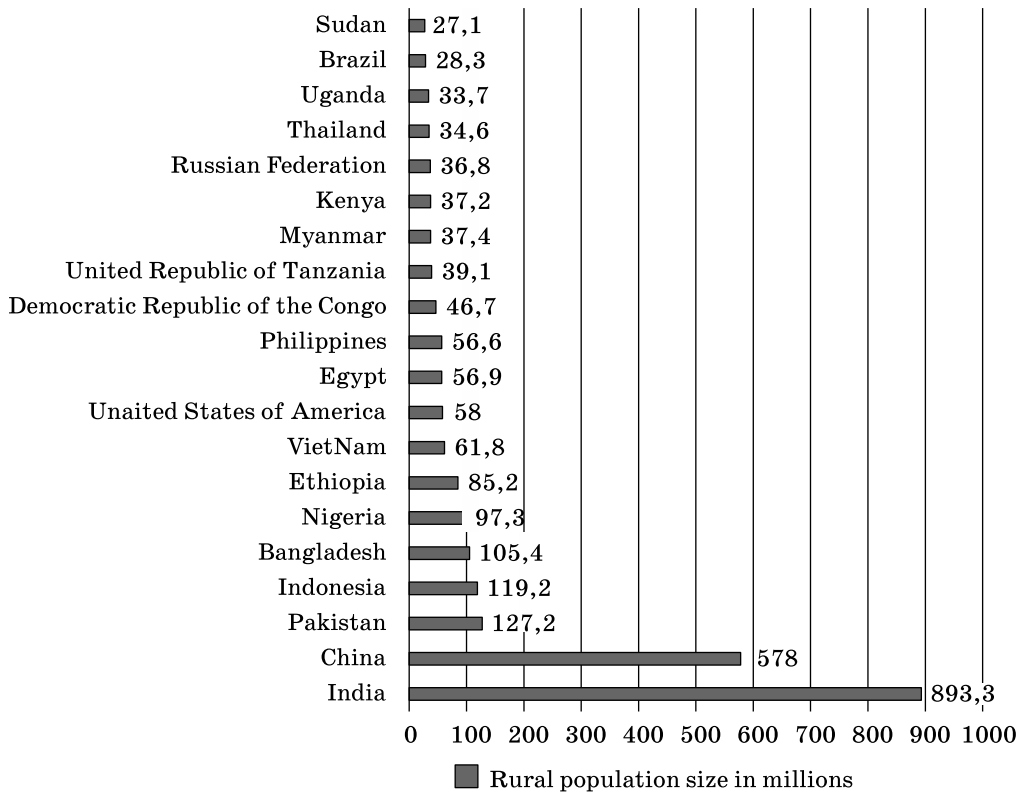


Fig. 1. Top twenty countries worldwide with the largest rural population in 2018 (in millions)

Source: the author's calculations are based on statistical data (Statista) [Electronic source]. URL: <https://www.statista.com/statistics/875087/top-ten-countries-with-biggest-rural-population/> (accessed: 06.07.2022)

The level and structure of mortality are due to the complex interaction of many factors, and socio-economic and environmental factors playing a significant role. Today, the main causes of death are diseases of the so-called endogenous type, i. e. associated with disruption of the activity of the most important systems of the body.

In 2020, life expectancy in rural areas in Russia averaged 70.7 years. For urban dwellers, the average life expectancy at birth was 71.54 years.

Since 2016, the birth rate among the rural population in Russia has decreased, and it amounted to 1.74 in 2020 (Fig. 4).

At the same time, the birth rate in rural areas exceeded the average number of children born per woman in urban areas for the entire period. The decline in the birth rate both in the countryside and in the city shows that its causes are common to all territories and are most likely associated with a decrease in the standard of living and income of the population. Since social problems in rural areas are more acute than in cities, the answer to them had manifested itself earlier in the form of a decrease in the birth rate [20].

Based on the statistics, we can conclude that there is the ongoing process of depopulation and desertification of rural areas. Despite the fact that Russia is still not

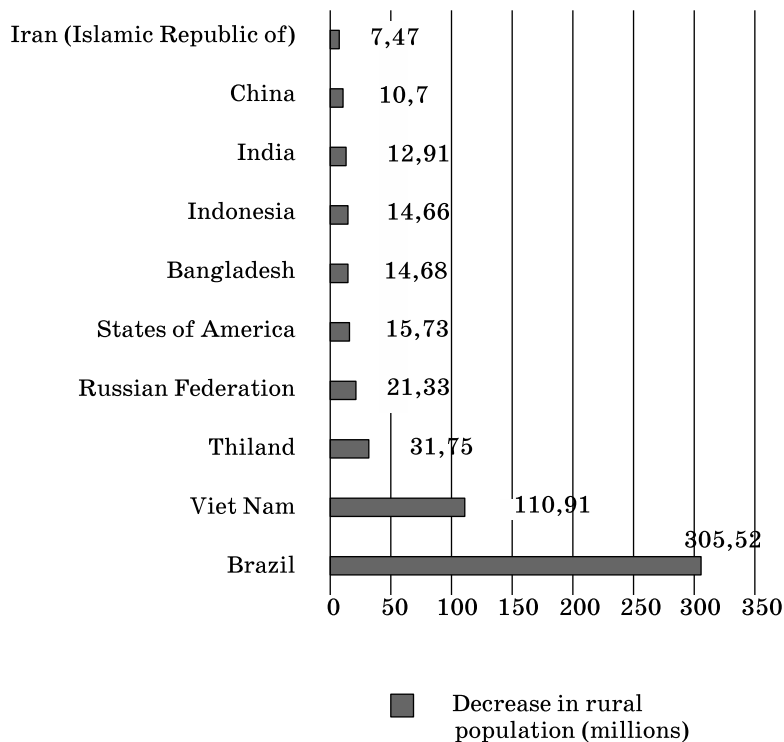


Fig. 2. Top ten countries worldwide with the largest projected decline in the rural population between 2018 and 2050 (in millions)

Source: the author's calculations are based on statistical data (Statista). [Electronic source]. URL: <https://www.statista.com/statistics/670958/top-ten-countries-with-projected-decline-in-rural-population/> (accessed: 06.07.2022)

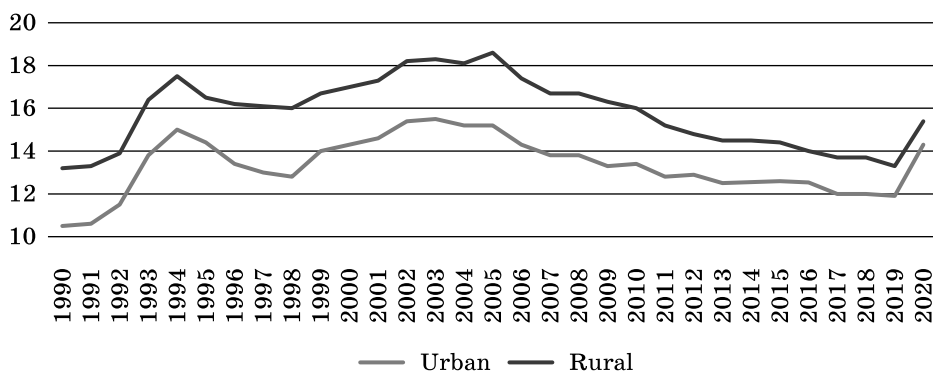


Fig. 3. Mortality rate per 1,000 population in Russia from 1990 to 2020, by type of area

Source: the author's calculations are based on statistical data (Statista). [Electronic source]. URL: <https://www.statista.com/statistics/1041628/russia-number-of-deaths-per-area/> (accessed: 06.07.2022)



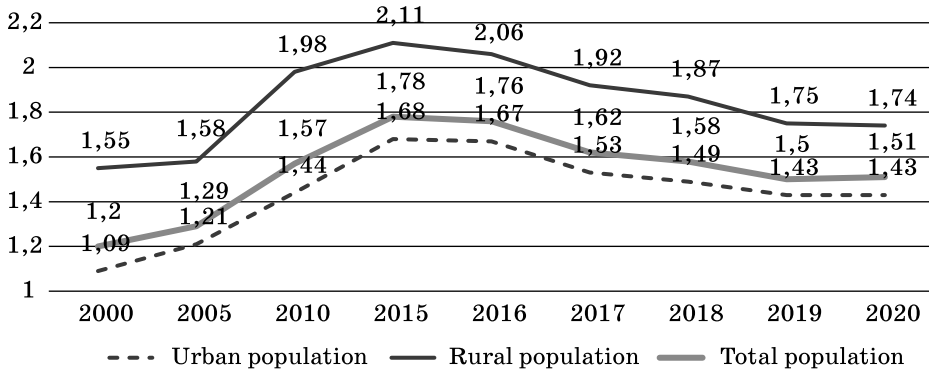


Fig. 4. Fertility rate in Russia from 2000 to 2020, by type of area (in children per one woman)

Source: the author’s calculations are based on statistical data (Statista). [Electronic source]. URL: <https://www.statista.com/statistics/1005471/fertility-rate-russia-area/> (accessed: 06.07.2022)

a highly urbanized country, the forecasts remain disappointing and, if the scenario of the development of rural areas is not changed, soon we will see extinct rurality and a hyper-concentration of the population in large cities.

The main reasons for the decrease in the population in rural areas are as follows: low standard of living, unemployment, lack of accessible infrastructure, low provision of housing and communal benefits.

The categories of “standard of living” and “quality of life” are among the most important socio-economic ones. Quality of life includes the key factors that influence what people value in life beyond its material aspects. These factors are related to, for example, safety or time costs. An evaluation of standard of living may include such factors as income, quality and availability of employment, poverty rate, life expectancy, climate, safety, or cost of goods and services. Standard of living is often used to compare geographic areas or different moments in time. Quality of life is more subjective and intangible than standard of living [12]. Such a view is more in line with the content that is laid down in the 17 SDGs.

Thus, the task of finding innovative mechanisms for sustainable rural development is urgent.

### *An Ecosystem Approach to Sustainable Rural Development*

The search for organizational and managerial models ensuring sustainable development has been going on for more than a dozen years. These models include clusters, networks, and agro-industrial and eco-industrial parks. Each of these models has its own advantages and limitations [39].

Currently, it is becoming problematic for an individual enterprise, even with a large capacity margin, to ensure sustainable development while maintaining competitive advantages, flexibly and instantly adapting to the requirements of external environment. And it is practically impossible to respond to new challenges for small and medium-sized enterprises.

In our opinion, the use of an ecosystem approach to the development of rural areas can make a certain contribution to solving this problem. The concept of an ecosystem is borrowed from the natural sciences (biology, ecology, etc.), where it is defined as a system consisting of a community of living organisms (biocenosis), their habitat, a system of connections that exchange matter and energy between thereof. In eco-

conomic science, in a broad sense, an ecosystem is understood as a wide, but finite circle of participants united by a single concept aimed at effective and successful activities carried out in a limited area.

An ecosystem is the development of a cluster model, while combining the most promising practices of interaction and coordination of participants and supplementing them with new principles necessary in the transformation of behavioral organizational and economic mechanisms of economic entities.

Speaking about the ecosystem, it should be noted the complexity and ambiguity of the interpretation of this term in the literature. An "ecosystem" is often seen as a metaphor for a specific kind of network and network externalities, for a specific market or market niche, to reflect the complementarity of physical, human and intellectual assets, or spillover effects arising from joint activities [13]. The underlying idea of this concept is that enterprises today not only compete with each other by developing effective market strategies in order to achieve competitive advantages, relying on their own resources, abilities and knowledge. In today's unstable and turbulent environment, economic agents are increasingly building their strategies and forming competitive advantages based on the sharing of resources, network externalities (external effects) and knowledge transfers (spillover effects). This requires the development of new conceptual approaches reflecting real trends, and the theory of ecosystems being the one.

The proposed ecosystem rationale for rural development does not directly relates to mainstream regional clusters. Meanwhile, it is based on several regional clustering policy advantages, such as creation of economies of scale and scope; reduction of costs and increasing efficiency; stimulation of innovation, etc. [27]. Meanwhile, the ecosystem approach can help to overcome the disadvantages of regional clustering, including reducing diversity in the regions; placing in disadvantage non-dominant regional industries; increasing the economic dependency of regions; increasing the resistance to change in certain clusters; potential lack of any propensity from certain companies to cooperate with each other [27]. These are, in our view, all important aspects for increasing the development of small territories.

The cluster policy is based on the selected sectoral regional specialization. While the ecosystem assumes "connected" diversification, that is, the agglomeration of enterprises of the same and related sectors, connected by different forms of interactions.

Having applied the ecosystem concept to justify the unequal development of small and medium-sized businesses in Russia, several authors come to the conclusion that the more advanced ecosystems can successfully withstand external shocks (e.g., reduction of incomes of the population) and the better use of development opportunities [13]. Some authors trace the relationship between the ecosystems and new business opportunities [40].

A number of researchers associate the development of ecosystems with the quality of life of citizens in a certain territory. However, having used a multidimensional approach, some authors specify a combination of categories of entrepreneurial, innovative and sustainable ecosystems while investigating the current state of ecosystems, their structural and changing dynamics, and its impact on the quality of life of rural citizens.

Here are some of the ecosystem approach principles: self-organization and self-development; trust and partnership; corporate culture; customer centricity; project orientation; innovation and openness to changes; collaboration through the exchange of information and intellectual resources; transboundary and interdisciplinary [39].

Having analyzed the approaches to the concept of an "ecosystem", we note that an ecosystem is a voluntary association of enterprises and organizations, complexes, and networks forming collaborative interactions, which presupposes long-term agreements between the participants (Tolstykh, Gamidullaeva & Shmeleva, 2021). This ensures that all participants have an equal position in decision-making, allowing them to arrive at an

agreed strategy of actions for each specific project. In our opinion, such definition most precisely reflects the principles of self-organization and collaboration, which were originally laid down in the concept of an “ecosystem” as an analogue of natural environment. As a rule, such ecosystems are formed around large universities or enterprises generating new ideas and technologies. In practice, ecosystems are often associated with digital platforms, though any digital solution is just a tool for implementing the ecosystem approach [38].

There is a synergistic effect in an ecosystem when new technologies and projects stimulate productivity growth within the company, in the supply chain, and between different industries [38; 39].

Agro-industrial, industrial and engineering enterprises, IT-startups, research and scientific organizations, resource providers, industrial regulators and territorial authorities, that is, any organization interested both in its innovation development and the territory as a whole, can be a participant (actor) of a rural ecosystem.

In practice, a rural ecosystem should be created around an industrial cluster in industries such as agriculture, industry, accommodation and food service activities. Its creation should be facilitated by a competent and verified policy aimed at improving the quality of life in this territory and counteracting the trend of population migration.

A rural ecosystem can be geographically considered as unification of several administrative districts with a common resource, institutional and socio-economic potential within a vast region. The problem of identifying or delimiting an ecosystem is similar to the delimiting clusters in a given territory. First, it must have a certain number of interactions, connections and interdependencies. Secondly, it should include the ability to have economic specialization in the sector, as well as the potential to implement the circular economy plan in its territory. Third, streamlined processes of territorial governance and cooperation in several areas between local authorities could contribute to the implementation of the strategy. Finally, existing links of physical accessibility between small territories (physical proximity and connectivity) must be considered to delineate these clusters [27].

The following advantages of using the ecosystem approach for the territorial socio-economic development can be highlighted:

- increasing the efficiency of interaction between organizations and enterprises of an ecosystem;
- increasing the efficiency of budgetary spending by prioritizing the recipients of state support;
- increasing the consistency and effectiveness of regional economic policy;
- providing balanced spatial development of a territory;
- stimulating sustainable development of rural areas as a whole, which implies coordination of economic, social, and environmental development goals [20].

Meanwhile, the lack of formalization and proposing indicators without clear reasoning of the causes and effects of phenomena and processes can be considered a challenge for the ecosystem concept [43].

We should bear in mind that implementation of the ecosystem model requires different coordination systems and interaction mechanisms between actors aimed at stimulating sustainable development of a territory (rural area). In practice, the roles of actors are not clearly defined and may change as the ecosystem develops. The role of a core organization (focal firm) in coordinating the ecosystem has been extensively explored in the literature. Successful commercialization of a new technology often requires accompanying changes in complementary activities within the ecosystem [10]. Clear rules for cooperation and interaction of actors are required for the development of an ecosystem. Rural ecosystems development policies will also call for a more integrated, and bottom-up policy approaches to engage local communities in their implementation.

In turn, it substantiates the necessity in a more objective, transparent and barrier-free mechanism for involving participants in an ecosystem required to be operationalized in a more effective and efficient manner which is developed and proposed in the following Section.

### Method and Data

To solve the stated problem, the authors propose an algorithm for the selection of participants in a rural ecosystem, which includes key assessment factors formed in accordance with the strategy of sustainable development of the territory in which the ecosystem functions, and the development strategy of the ecosystem itself (Fig. 5).

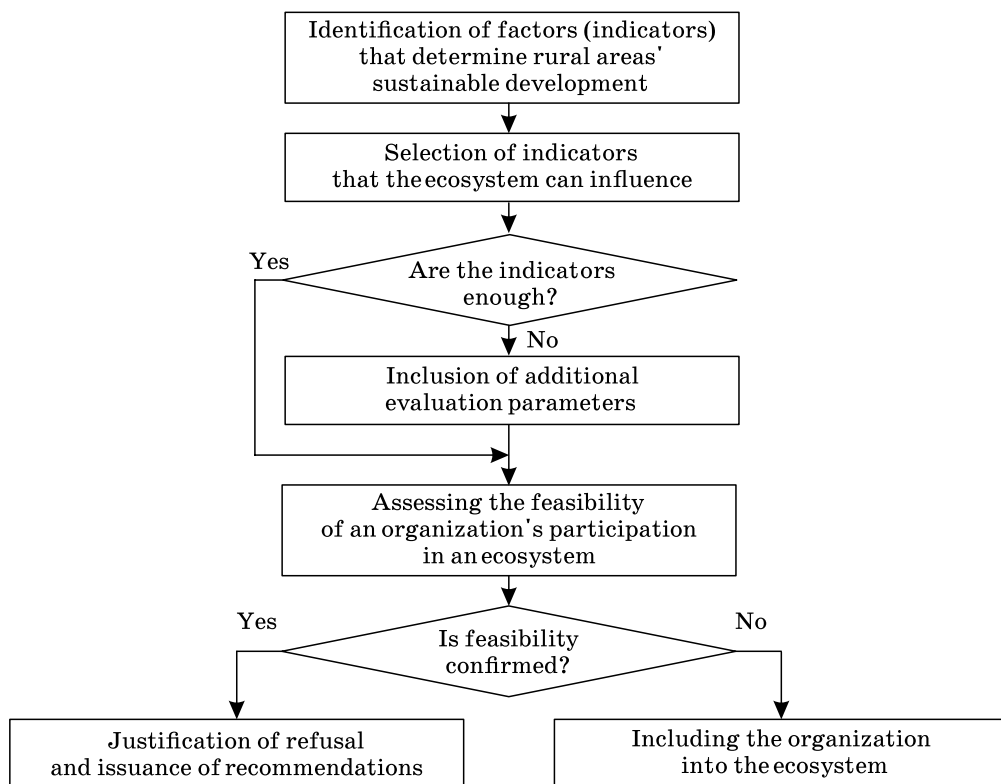


Fig. 5. An algorithm for the selection of participants (actors) in a rural ecosystem.

### Results

A possible system of indexes and indicators, formed taking into account the target indicators for the implementation of the strategy for sustainable development of rural areas on the example of the Penza region, is presented in a Table.

The objectives of sustainable development of rural areas in the studied region were set in 2014 as part of the implementation of the subprogram The Sustainable Development of Rural Areas of the Penza Region for 2014–2017 and until 2022 and the State Program of the Penza Region Development of the Agro-Industrial Complex of the Penza Region for 2014–2022.

**A system of indicators**

<b>Index</b>	<b>Integrated Indicator</b>
Rural population, thousand people	Demography
Rural population growth/decline rate	
Infant mortality (deaths under 1 year of age per 1,000 live births), %	Public Health
Life expectancy at birth, years	
Number of treatment and prevention organizations, units	
Final consumption expenditures, on average per household member, per month, rubles	Income Level
Investments in fixed assets at the expense of the municipal budget, thousand rubles	Investment
Expenditures for the implementation of measures for the sustainable development of rural areas from the federal and regional budgets within the framework of the State Program for the Development of Agriculture and Regulation of the Markets of Agricultural Products, Raw Materials and Foods, per one villager, thousand rubles	
The total area of residential premises, on average per one inhabitant in rural areas, sq. m.	Rural Housing Stock
The share of the area of the housing stock, provided with all types of improvement, in the total area of the housing stock, %	
Share of families who received housing and improved housing conditions in the total number of families registered as needing housing, %	
Number of pre-school institutions, units	Education
The number of pupils in pre-school educational institutions — total, thousand people	
The number of state educational institutions, units	
The number of students in general education institutions — total, thousand people	
The number of club and leisure institutions of the Ministry of Culture of the Russian Federation, units	Culture
The share of buildings of clubs and leisure-type establishments of the Ministry of Culture of the Russian Federation that are in an unsatisfactory condition, %	
Number of employees of club-type institutions, people	
Number of cultural events, units	
Number of libraries and branch libraries, units	
Share of libraries with Internet access, %	
Number of registered library users, thousand people	
Number of sports facilities, units	
Number of places in tourist collective accommodation facilities, units	Tourism

Index	Integrated Indicator
Number of stores — total, units	Market
Trading floor area — total, sq.m	
The number of consumer services facilities for the population, units	
Number of reception points for consumer services of the population, units	
Number of catering facilities, units	
The area of the hall for serving visitors to public catering facilities — total, sq.m.	
Share of non-gasified settlements, %	Housing and Communal Services
Specific weight of heating and steam networks in two-pipe calculation in need of replacement,%	
Specific weight of the street water supply network in need of replacement,%	
Specific weight of the street sewer network in need of replacement,%	
Solid household waste removed, thousand cubic meters	
Share of rural settlements served by postal services,%	
Share of rural settlements with telephones,%	

Source: the author's calculations are based on statistical data (Rosstat, Server of Statistics of the Ministry of Culture of the Russian Federation, Ministry of Sport of the Russian Federation) [Electronic source]. URL:<https://eng.rosstat.gov.ru/>, [https://www.gks.ru/free\\_doc/new\\_site/region\\_stat/sel-terr/sel-terr.html](https://www.gks.ru/free_doc/new_site/region_stat/sel-terr/sel-terr.html), <https://stat.mkrf.ru/>, <https://minsport.gov.ru/en/> (accessed: 16.07.2022).

Naturally, the list of indicators should vary from the standpoint of the different roles of the participants in the rural ecosystem (developers, resource providers, integrators, regulators, etc.), as well as data accumulates and the patterns of ecosystem functioning and the dynamics of achieving strategic goals for the territorial development, including SDGs. A digital platform that implements most of the functions for the selection, coordination of participants and managing interaction of all stakeholders should become a tool for successful implementation of the ecosystem approach to territorial development [21; 34].

## Conclusion

Today small territories face acute socio-economic and demographic challenges, which can lead to the erosion of the quality of life of rural residents, shrinking employment opportunities, and enhance the imbalance in the country's economic space.

Ecosystem approach as an emerging concept and greatly promising concept carry even greater potential for the application of rural territorial capacity comparatively to the participative approach and clusters [7; 26; 27; 31].

Meanwhile, this approach is well established and generally acknowledged primarily in the industrial sector [14; 15]. In particular, the authors of the article dealt with the problem of the development of industrial ecosystems and proved their socio-economic efficiency for territorial development on the example of Novokuznetsk city [19].

Ecosystems are crucial in this because efforts to enhance infrastructure and institutions in a territory often require collective action. As such, companies should try to enlist partners to share the cost, gain support, and assemble the right skills. The ecosystem model makes it possible to form a special friendly environment from various participants through a voluntary partnership for the generation and implementation of innovative projects. This enables ecosystem actors to be open to external challenges through the integration of resources, knowledge, technologies, and competencies, ensuring the principles of sustainable development. Each ecosystem participant not only consumes products in the form of new knowledge, information, technologies, materials provided by other participants, but also creates products for the next links in such chains.

The effect of creating a rural ecosystem will have a positive effect on all types of businesses and on the citizens living in this area. Rural areas have the potential to be more focused on sustainability, balance and well-being, rather than on economic growth [29]. Participants of a rural ecosystem are tend to be innovative and generate sustainability-led innovations [26].

The authors propose an ecosystem approach to rural development, allowing using all the advantages of territorial clusters (industrial, innovation), while reducing the disadvantages inherent to mainstream cluster approach. The main features of ecosystems are maximum implementation of self-organization principle of actors (all stakeholders) and minimizing vertical interactions between thereof. The implementation of this approach is fundamentally impossible without the use of modern information technologies [21].

In the article, there is an attempt to operationalize an ecosystem approach in terms of organizing the process of selecting actors in the rural ecosystem to provide its balanced development. For this purpose, the authors have developed an appropriate methodology that can be applied within the framework of the organizational and economic mechanism for managing rural territories.

The novelty of the proposed approach also lies in the potential benefits of revealing (limiting) rural ecosystems to implement integrated, sustainable, innovative and place-based regional development policy strategies. In practice, the selection of ecosystems can take place on the basis of existing clusters, but it is important to emphasize that these clusters should arise from the bottom up and not from the top down, in order to facilitate their further natural development and evolution within the rural ecosystem [27]. From a practical point of view, the ecosystem approach to the development of small territories will help to develop separate sub-regional support programs using funding from regional government support and development programs. These integrated approaches to territorial development for each ecosystem will maximize the use of the available territorial capital of the region. Putting things in perspective, this policy approach has the potential advantage of stimulating new investment and skills targeting the specific territorial capital of an ecosystem.

The effectiveness of the implementation of such a policy will depend on such factors as the amount of investment made in each ecosystem development strategy, and the institutional structure and administrative capacity for its implementation.

However, the key problem is to organize the interaction between actors based on the ecosystem principles, and focusing on sustainable development being the dominant one. This requires additional research into the interests of these enterprises, and elaboration of organizational and economic mechanism for the ecosystem projects' implementation. It is also promising to develop an algorithm including steps to implement the ecosystem approach strategy for regional development. This is a direction for further research within this scientific problem. Additionally, it is reasonable to provide a comparative analysis between the proposed ecosystem approach, clusters and other participatory approaches in terms of rural development in order to reveal their differences, specific characteristics and application perspectives in rural policy.

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## Competing interests

The authors declare that they have no competing interests.

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