



**“BİOLOJİ MÜXTƏLİFLİYİN QORUNMASI VƏ EKOLOJİ CƏHƏTDƏN
DAYANIQLI SOSIAL-İQTİSADI İNKİŞAFA DOĞRU” MÖVZUSUNDA
BEYNƏLXALQ ELMİ KONFRANSIN**

MATERİALLARI

Lənkəran, 22 dekabr 2023-cü il

**AZƏRBAYCAN RESPUBLİKASI ELM VƏ TƏHSİL NAZİRLİYİ
LƏNKƏRAN DÖVLƏT UNİVERSİTETİ**

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Sustainable development of agriculture

The group of theorists and supporters of sustainable development view it as the most promising ideology of the 21st century and possibly even the third millennium. They believe that this ideology, backed by scientific justification, has the potential to replace all existing worldview concepts, which they consider fragmented and incapable of ensuring balanced development of civilization.

Sustainable development is a systematic management approach based on a systems approach and the use of modern information technologies. These technologies allow for rapid modeling of various development scenarios, accurate prediction of their outcomes, and selection of optimal directions.

It is important to note that different countries have their own development strategies, and while some have just started on this path, others are already on it, and some have achieved sustainable economic development (such as the USA, Japan, European Union countries). There are also countries that prioritize survival as their main goal, which can pose a threat to other nations and regions. The achievement of sustainable regional development is complicated by the close proximity to other countries, which leads to environmental risks. Additionally, globalization, gaining momentum, contributes to the formation and exacerbation of economic and social problems that affect regional development.

Many aspects of the natural resource deficit have been delayed by the rapid development of technology at the turn of the 21st century, which has allowed for increased efficiency in production, electricity generation, and reduced paper demand. However, the world's population exceeded 8 billion in the year 2023 (compared to only 3.7 billion in 1970), and it is projected to reach 10 billion by 2050. The scarcity of resources will undoubtedly become a pressing issue in the second half of the millennium.

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In achieving sustainable development of the global community, agriculture plays and continues to play a key role, collaborating with a wide range of services. Its task is to ensure social and economic development, as well as the preservation of the environment.

The special significance of agriculture is explained by its naturalness and direct utilization of natural resources, especially the fertile (organic) soil layer that has been forming for millennia. Agriculture has a significant impact on the environment, particularly in rural areas.

However, history has shown that the impact of agriculture on nature has been predominantly negative due to the intensification of production to meet food needs and

constantly improve its quality. This has caused problems such as soil erosion, depletion of groundwater, salinization and swampification of lands, as well as pollution of the environment with residues of mineral fertilizers and pesticides. These negative consequences have become a threat to human health, leading to an increase in cancer incidents and birth defects, while also disrupting natural mechanisms of biological balance.

It has been revealed that ecosystems that had the ability to self-recover for centuries are now destroyed. Humanity, by satisfying its current needs, is depleting resources intended for future generations. Consequently, modern agriculture, along with other industries, has become a significant threat to the global goals of the world community.

The intensification of agriculture in the 20th century, which includes the transition from natural fertilizers to artificial ones, the use of machines instead of horses, the mechanization of agricultural processing technologies, and more, has led to an increase in crop yields in developed countries. However, this positive trend has been accompanied by high energy costs, the intensification has led to the depletion of non-renewable resources, the generation of increasing amounts of waste, and a shortage of renewable resources such as fresh water.

The world community now faces the problem not only of ensuring food security for the population but also of the rapid depletion of non-renewable resources. This becomes a serious threat, and in order to achieve sustainable agricultural development, as stated in FAO documents, it is necessary to focus on preserving soil fertility, rational use of water resources, and careful management of the genetic potential of plants and animals.

Also, it is important to consider that the concepts of "development" and "sustainable agricultural development" are not identical. Development implies gradual changes over time, which may involve leaps and transitions to new qualitative levels. Such an approach is crucial for addressing sustainability and development issues in agriculture and other economic sectors.

The transition of a system from one state to another occurs under the influence of numerous external factors on the parameters of the current state of the system, known as input variables. This is defined as a change in the characteristics that determine the internal state of the system. The behavior of the system, in turn, is expressed through a set of output variables, which are characterized by values that reflect the goal of control and the alignment of the system's movement with the optimal trajectory.

Unlike the abrupt transition between levels, the term "sustainable agricultural development" refers to the long-term maintenance of balance between the economy, social sphere, and the environment, specifically the preservation of stable agroecosystems. The main objective is to provide not only agricultural producers but also the population unrelated to agriculture with products, while simultaneously preserving natural resources, including soil fertility.

This indicates that agriculture, as part of the economy, is an unstable system that requires constant influence from external factors. The state should direct its energy towards minimizing the impact of external factors and ensuring effective agricultural management, making it less prone to crises and disasters.

In the development of a system, it is important to consider the absence of jumps and large deviations in its trajectory. Sustainable agriculture is a system that can consistently reproduce its potential, including the natural environment, means of production, and people, over a long period.

In other words, the concept of sustainable agriculture suggests that agriculture (as a system) must exist and function within certain allowable values of variables that define the state of this system over a long (practically infinite for human civilization) period of time. Merely involving self-regulation by economic agents, for example, through the choice of the optimal structure of agricultural production that best corresponds to the soil and climatic

conditions of regions (with minimal impact on the environment), increasing field and farm productivity, and regulating reserves and insurance funds, is insufficient to achieve this goal.

Modern agriculture faces challenges of development and sustainability that require a comprehensive and integrated approach. Agricultural development is associated with gradual and sometimes rapid changes, while there is also a need for long-term system stability. The necessity of managing risks and vulnerabilities of agriculture to external factors becomes relevant, and the state should actively direct efforts towards creating resilient and sustainable systems.

The concept of sustainable agriculture defines the need for long-term balance between economic, social, and ecological dimensions. Preservation of natural resources, efficient use of technologies, and self-regulation become key tasks for ensuring sustainable development. Successful adaptation to changes in social, economic, and ecological environments requires flexibility and adaptation skills of agricultural systems to new realities.

Overall, sustainable agriculture is defined not only by ensuring food security but also by preserving natural resources and stability of agro-ecosystems. To achieve these goals, it is important to combine innovation and effective management, taking into account interconnections and interactions between different aspects of farming.

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Underground urbanization and urban landscape sustainability (based on the Samara city example)

Urbanization, namely the process of increasing city areas and the number of people living there, is a modern trend for almost all countries of the Earth. The lack of land resources as a territorial base for urban development is becoming an acute problem, which leads to the growth of the city not only in width, but also in vertical direction. The so-called "underground urbanization" takes place, which is a special process of development of underground space, transfer of industrial enterprises, transport and other communications. Museums, shopping centers, restaurants, etc. are located underground, which makes it possible to place parks and green areas on the surface and increase the comfort of the urban environment. However, with all the positive aspects of underground urbanization development, one should take into account the possibility of new environmental, especially geo-ecological problems caused by the activation of existing and new exogenous geological processes.

Historically, the underground space of Samara has been used for laying engineering communications that provide residents with heat, water, communications, electricity, and also serve for sewage disposal. The underground construction in Samara was started in the XVIII century, when during the construction of the second Samara fortress to strengthen landslide slopes, wooden "cages" were created, which were filled with sand. They were studied during archaeological excavations on the territory of Khlebnaya Square (Fig. 1) [4].