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## MECHANISMS FOR REGULATING ECOLOGICAL PROBLEMS IN AGRIBUSINESS (THE CASE OF GEORGIA)

*Natural resources are a national treasure which forms the material basis for the development of the country. Rational and complex use of these resources determines economic self-sufficiency of the country and raising the economic well-being of its population. A significant part of the progressive-minded people around the world agree that due to the impact of economic activities on the environment, the excessive and often irrational use of natural resources in the contemporary world, the present society faces with numerous local and global problems in terms of environmental pollution, which have become even more acute in recent years. Disturbance of the natural balance of the environment is closely connected to the intensification of agricultural activities. No other field of economic activity is so much related to the use of natural resources as agriculture. With the purpose to meet the needs of the society, agribusiness uses the resources that are available in nature and impacts the environment that results in a wider degradation of the latter. The scarcity of land, water and other types of resources is becoming more and more evident. The importance of normalization of the relationship between agribusiness and environment for maintaining ecological balance of the environment is increasing and this implies not the reduction of such activities, but a careful and saving attitude towards the environment. The protection of the environment and the rational use of natural resources along with the development of agriculture is an essential precondition for the sustainable development of our country. The present paper does not aim to fully assess the environmental problems caused by agribusiness. The paper assesses three important environmental problems - soil degradation, threats due to plant and animal waste, and threats from mineral fertilizers and chemicals. In addition, mechanisms for regulating these problems are provided.*

*Keywords. Georgia, environmental protection, natural resources, soil degradation, plant and animal waste, mineral fertilizers, institutional mechanisms.*

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## МЕХАНІЗМИ РЕГУЛЮВАННЯ ЕКОЛОГІЧНИХ ПРОБЛЕМ В АПК (НА ПРИКЛАДІ ГРУЗІЇ)

*Природні ресурси є національним надбанням, яке становить матеріальну основу розвитку країни. Раціональне і комплексне використання цих ресурсів визначає економічну самодостатність країни та підвищення економічного добробуту її населення. Значна частина прогресивно налаштованих людей у всьому світі погоджується, що через вплив економічної діяльності на навколишнє середовище, надмірне і часто нерациональне використання природних ресурсів у сучасному світі сучасне суспільство стикається з численними локальними та глобальними проблемами. Умови забруднення довкілля, які останніми роками ще більше загострилися, порушення природного балансу навколишнього середовища тісно пов'язане з інтенсифікацією сільськогосподарської діяльності. Жодна інша сфера економічної діяльності не пов'язана так сильно з використанням природних ресурсів, як сільське господарство. З метою задоволення потреб суспільства агробізнес використовує наявні природні ресурси та впливає на навколишнє середовище, що призводить до ширшої деградації останнього. Дедалі очевиднішим стає дефіцит землі, води та інших видів ресурсів. Значення нормалізації взаємовідносин агробізнесу з навколишнім середовищем для збереження екологічної рівноваги довкілля зростає, що передбачає не скорочення такої діяльності, а дбайливе та бережливе ставлення до навколишнього середовища. Охорона навколишнього середовища та раціональне використання природних ресурсів разом із розвитком сільського господарства є важливою передумовою сталого розвитку нашої країни. Ця стаття не має на меті повної оцінки екологічних проблем, спричинених агробізнесом. У статті оцінено три важливі екологічні проблеми – деградація ґрунтів, загрози від рослинних і тваринних відходів та загрози від мінеральних добрив та хімікатів. Крім того, передбачені механізми регулювання цих проблем.*

*Ключові слова: Грузія, охорона навколишнього середовища, природні ресурси, деградація ґрунтів, рослинні та тваринні відходи, мінеральні добрива, інституційні механізми.*

### Ecological Problems of Agribusiness

As it is widely known, land represents the main resource of agricultural activity. Georgia is not very rich in land and natural resources. Land is one of the main national treasures; therefore, a careful and prudent attitude to land is especially important for fully considering economic as well as ecological interests of the country's population. The intensification of agricultural activities impacts the soil quality and fertility. The more intensively the land is used, the more effort is required to maintain its quality and fertility. Improperly carried out agricultural activities lead to soil degradation. Due to this problem land becomes unusable for agricultural use, the food supply of the population is endangered and the ecological safety of the natural environment is reduced.

According to the World Bank study, about one third of the 3 million ha of agricultural land of Georgia is affected by soil erosion, 7–8 percent is affected by waterlogging due to malfunctioning drainage systems, and another 7 percent is affected by salinity. The same study has shown that soil degradation reduces the benefits of agricultural production on the eroded soils. In 2018, the land productivity loss of 1.8 percent was estimated based on the combined use of the Revised Universal Soil Loss Equation (RUSLE) and MAGNET models. The application of

the land productivity reduction coefficient to the total value of cultivated products in agriculture resulted in the total annual agricultural productivity cost at about US\$11.9 million [1, p.13].

Disruption of the soil ecosystem is caused by the processes which are related to agricultural production, such as systematic loosening of the soil, use of mineral fertilizers and pesticides, irrigation and drainage systems, overgrazing of pastures, deforestation, etc. The problem of erosion is especially acute in mountainous areas, which, along with natural processes, is facilitated by ploughing in sloping areas without making terraces, unauthorized scything in mountainous areas, excessive grazing, uncontrolled and unsystematic cutting of forests, and degradation of conifers. These are just a few of the reasons which have brought soil in the mountainous areas to the brink of depletion. Soil erosion along the Black Sea coast is caused by overflowing riverbeds. Degraded land areas are most widespread in eastern Georgia, where overgrazing and the reduction in rainfall have caused wind erosion [2, p.8].

Complete elimination of the factors causing the disruption of the soil ecological system is practically impossible, but planned and controlled approach allows us to reduce the negative impact of this or that factor on the soil. According to the experts, "for the reduction of soil degradation, it is important to take some of the measures for protecting soil in the areas where wind and water erosion are prevalent; in particular, these measures are introduction of seed rotation, strip sowing, making fields from heavily eroded lands, retention of snow with perennial grasses, building forests in sandy areas, development of field protection forest lines, as well as cultivating soil without turning it over, leaving stubble on the surface, optimal loading of pastures, etc." [2, pp.44–48].

Mitigating soil degradation problem requires combining the traditional experiences of the people employed in agriculture with modern technological skills. To this end, it is important to raise the level of knowledge in environmental issues. Raising public awareness on soil pollution and farmers' awareness on ecologically proper and scientifically approved agricultural practices will allow the people employed in agriculture to select and use the best agricultural methods such as biological methods of pest control, use of organic fertilizers, proper use of pesticides, etc. From this perspective, we consider that it is advisable to receive the assistance from the international organizations, such as Greenpeace, the World Wildlife Fund (WWF), the UN Environment Program (UNEP), the World Environmental Organization (WNO), the Climate Group, etc.

Mitigation of land degradation will have a significant positive impact on the incomes of the most vulnerable families living in rural areas. The 2016 Household Survey estimated household incomes in the regions which have different forest cover and are influenced by different natural hazards. An analysis of income diversification data indicates that more than 20 percent of households have absolute dependence on income generated by forests. Rural populations extract on average 47–61 percent of their income from agriculture and forestry. The estimations reveal that for the poorest 20 percent of the population the poverty gap<sup>46</sup> would reduce by six percentage points if landscapes are restored, which would improve the social situation of households in rural areas [1, p. 19].

The dangers posed by the waste of animal and plant origin represent another important ecological problem related to agricultural activities. The total amount of agricultural and animal waste in agriculture exceeds thousands of tons per year. This waste promotes the growth of pathogenic microorganisms, damages important areas and can even become the cause of ecological imbalances. We have the ability to manage this waste in a wise manner if we consider the experience of the developed countries and use the waste to obtain protein- a high-molecular-weight natural organic compound, which is necessary for human life [3, p.12].

It is worth noting as well that plant and animal waste can also be used for getting thermal energy and biogas, which will help reduction of environmental pollution with waste. As experts estimate, the total energy potential of Georgia's livestock and poultry waste is estimated to be about 6.9 billion KWh of electricity and 734 million m<sup>3</sup> of natural gas. It is estimated that 5 to 60 m<sup>3</sup> of crude gas containing biomethane in the amount of its 60 percent is obtained from one ton of cattle farm waste. It is no different from natural gas. It is not different from natural gas in any way. Production of biogas does not require large financial costs and can be produced practically in any peasant, family owned farm, where waste of animal and plant origin is generated. Experts consider that this waste represents a promising resource for Georgia to improve the country's energy, economy and ecological situation [3, p.7].

Reduction of biological waste of livestock is an urgent ecological measure to be taken. As it is widely recognized, waste due to animal slaughter, carrion of animals and birds, defective products cause undesirable ecological processes when they get into water reservoirs and soils; in particular, uncharacteristic bacteria and algae began to develop, the risk of groundwater infection increases. Therefore, livestock biological waste belongs to the group of substrates that should be disposed of in special veterinary-disposal places [4, p.4].

The negative impact of agricultural production on the environment in terms of consumption of mineral fertilizers, pesticides and chemicals is significant. Consumption of mineral fertilizers used for the production of agricultural products in 2014-2016 was almost equal, in 2017 it decreased by 19%, mainly due to a 22% decrease in the use of nitrogen fertilizers, but the consumption of other types of fertilizers even slightly (5%) but still increased. As a result, the environmental impact of using mineral fertilizers in 2017 was somewhat reduced at the expense of reducing nitrogen fertilizers. The highest rates of using mineral fertilizers are observed in the following regions: Kakheti (23%), Samegrelo-Zemo Svaneti (20%), Imereti (18%) and Samtskhe-Javakheti (17%). Nitrogen fertilizers are still mostly consumed by these regions (77% in total), while other types of fertilizers are mainly used in Kakheti

(52%) and Samegrelo-Zemo Svaneti (30%) [5, p.259]. Most of nitrogen fertilizers (77% in total) are still applied in these regions, while other types of fertilizers are mainly used in Kakheti (52%) and Samegrelo-Zemo Svaneti (30%) [5, p.259].

Improper use of mineral fertilizers, pesticides and other chemicals, as well as improper storage practices lead to the pollution of not only agricultural land and agricultural products being in contact with chemicals, but water reservoirs as well, in which pollutants are encountered as a result of natural precipitation and irrigation. This has a significant negative impact on maintaining the ecosystem balance of groundwater and surface water bodies. In addition, consumption of polluted water for drinking or other purposes has a negative impact on biodiversity, human health and life.

It is also important to pay attention to the threats to environment caused by farmer service centers. These centers are accompanied by a number of negative factors such as improper storage of agrochemicals; processing of agrochemicals without special protective clothing; inadequate fire protection systems; storage of agrochemicals with veterinary medicines, food and other consumer goods; lack of proper instructions for storage and processing of agrochemicals, etc.

Mineral fertilizers, in case they are used properly, are an economically viable and environmentally safe measure to increase the production of plant products. Refusing to use mineral fertilizers will result to the reduction of food products. Therefore, the only correct approach to solving this problem is not to reject the use of fertilizers, but to radically improve the technology of using mineral fertilizers. "Different agricultural crops have different requirements for basic nutrients. Therefore, for evaluating in future how proper the amount of used fertilizers was considering the biological characteristics of the plant, climatic-soil conditions and crop level with the purpose to make appropriate adjustments if necessary, it is important to know what their harvest performance under the same yield conditions is" [6]. Minimizing the use of mineral fertilizers, pesticides, etc. is possible through the introduction of modern technologies, raising of awareness and knowledge sharing which should be implemented in accordance with the norms of sustainable consumption. In addition, for producing ecologically friendly products fighting against agricultural diseases with natural means should be encouraged as much as possible.

With signing the Association Agreement with the European Union, Georgia made a number of commitments to reduce various components of pollution of the natural environment. The Association Agreement requires from the Government of Georgia to reduce pollution in all the sectors of economic activity, including agriculture. Full implementation of this agreement will promote the use of modern technological methods in agriculture and the production of environmentally friendly products, which will allow the country to reduce imports of many agricultural products, which unfortunately outperform exports so far.

### **Institutional Mechanisms for Ecological Regulation of Agribusiness<sup>1</sup>**

The practice of economic activities clearly shows that the state should play an active role in the regulation of the ecological problems agribusiness faces. The development of institutional mechanisms for environmental protection and regulation of ecological problems is the main and inseparable direction of the national development strategies of Georgia. It is very important to reflect the right to environmental protection in the Constitution of our country. The Constitution of Georgia protects the right to environmental protection and the Article 29 of the second chapter of the Constitution - Right to environmental protection - states that "Everyone has the right to live in a healthy environment and enjoy the natural environment and public space. Everyone has the right to receive full information about the state of the environment in a timely manner. Everyone has the right to care for the protection of the environment. The right to participate in the adoption of decisions related to the environment shall be ensured by law." [7, p.20].

The Third National Environmental Action Program of Georgia 2017-2021 is of special importance for the regulation of the environmental policy. The main goal of this program is the sustainable and balanced development of the country, during which the environmental and socio-economic challenges are equally considered.

The strategic goals of this program are as follows: [8, p.11-12.]:

1. Improving the state of the environment, ensuring the protection/sustainable use of natural resources and avoiding / minimizing risks that endanger human health and the well-being of the population;
2. Improving the fulfillment of the obligations undertaken by Georgia within regional and global environmental treaties and further approximation to EU environmental policy, framework legislation and the requirements of specific directives;
3. Strengthening administrative structures for ensuring effective environmental management and implementation of environmental legislation;
4. Promoting sustainable development through the integration of environmental aspects into social and economic policy.

In addition to the above-mentioned normative acts, mandatory rules of conduct for agribusiness enterprises in our country are regulated by a number of laws on environmental protection and safety. Some of these

<sup>1</sup> In the present paper, we will limit ourselves only to the provisions of the Constitution of Georgia and the analysis of several normative acts, which define the rules for the regulation of ecological problems.

laws are on Environmental Protection; on Environmental Permits; on State Control of Environmental Protection; on Ecological Expertise; on Water; on Atmospheric Air; on Protected Areas; on Land Protection and Improvement of Soil Fertility; on Veterinary; on Human Health; on the Black Sea Basin and the Sanitary Code of Georgia; Food/Animal Feed Safety, Veterinary and Plant Protection Code; on Pesticides and Agrochemistry; on Plant Protection from Pests. It is important to note that Georgia is a member of numerous international conventions and agreements which supplement and specify national legislation.

In the developed countries, the current national agrarian and environmental policy for the reduction of environmental pollution from agribusiness, is aimed at limiting certain field technologies and traditional methods of agricultural production development and using alternative environmentally friendly technological methods instead [8]. In the given case, the modern approach to environmental pollution is to bring the economic criteria for profit maximization and cost minimization within ecologically acceptable and justified levels, which is reflected in the establishment of environmental pollution limits (quotas) for environmental polluters. Determination of ecological quotas will encourage agricultural companies to accelerate implementation of economic and environmental reforms that ensure that the needs of the community are met and at the same time the environment is protected from ecological pollution.

As a conclusion, it can be said that in regulating environmental problems the role of the state is not limited to only the above laws and regulations. By-laws, which provide specifications of the scope and rules of regulation or control of environmental protection and mitigation of environmental problems, are developed based on the above mentioned and other functional laws. Such regulations are developed in the institutions that implement state policies in protecting environment safety. In this regard, international agreements and conventions are also quite effective. The most important task of the above legal acts created on the basis of positive law is to avoid negative impacts on the environment caused by economic activities, to reduce the existing negative impact to an ecologically acceptable level and to improve the environment, which ensures long-term adaptation of present and future generations.

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