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# SUSTAINABLE DEVELOPMENT AND CHANGES OF AGRICULTURAL CONDITIONS

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Significant changes in economic relations between countries have occurred in the past few decades. This speed is due to the rapid pace of scientific and technical development and changes in the living environment. The growth of industry in many countries has led to the modification of the environment, the growth of the population has led to an increase in the rate of consumption of biological resources. In turn, these changes have provoked the need to transform the structure of agricultural production. Land resources are used more intensively, agricultural producers extract additional rent arising due to the current market conditions. In our opinion, this violates the sustainability of economic development and requires actions that will improve this situation.

Renewable resources usage involves the preservation or growth of them in time. The appropriate methodology can be based on biological models which describe the maintenance of ecosystem resilience.

For clarity, we can use the Gordon-Schaefer model. It presents a graph describing dependence of the usage of a renewable resource from its stock size. The greatest increase of the resource is assumed to be about half of reserve. The slowdown in growth after reaching half of the stock is associated with a rising disproportion of the resource in ecosystem – growth is accompanied by increasing efforts to life support of the resource.

Any amount of resource consumption which is less than $Y_{MAX}$ supposes two options for resource stock (fig. 1). For example, consumption of the volume $Y_1$ takes possible two volumes of stock – $X_2$ and $X_5$.

Let's consider which of these options is more attractive in terms of the risks of the effects of stock changes. Deviation from $X_5$ in the direction of reducing the resource reserve to $X_7$ (in reasons signed above) will lead to decreasing speed of resource restore from $Y_1$ to $Y_3$. If we continue to have consumption at the level $Y_1$, for some period of time stock of resource will approach zero. If the stock of resource $X_5$ deviates up to $X_6$, the resource stock will increase to $Y_2$, which will lead to possibility of more intensive usage of the resource over time.

Let's consider a similar change for the second option stock of resource $X_2$. So, decreasing stock of resource to $X_3$ will lead to a decreasing speed of growth to Y2. At the same time, with further consumption at the same $Y_1$ level, there are no prerequisites for the restoration of the resource stock. The deviation of $X_4$ will lead to increase in the resource consumption to $Y_3$, which in future will lead to degradation of resource and decreasing stock to $X_2$.

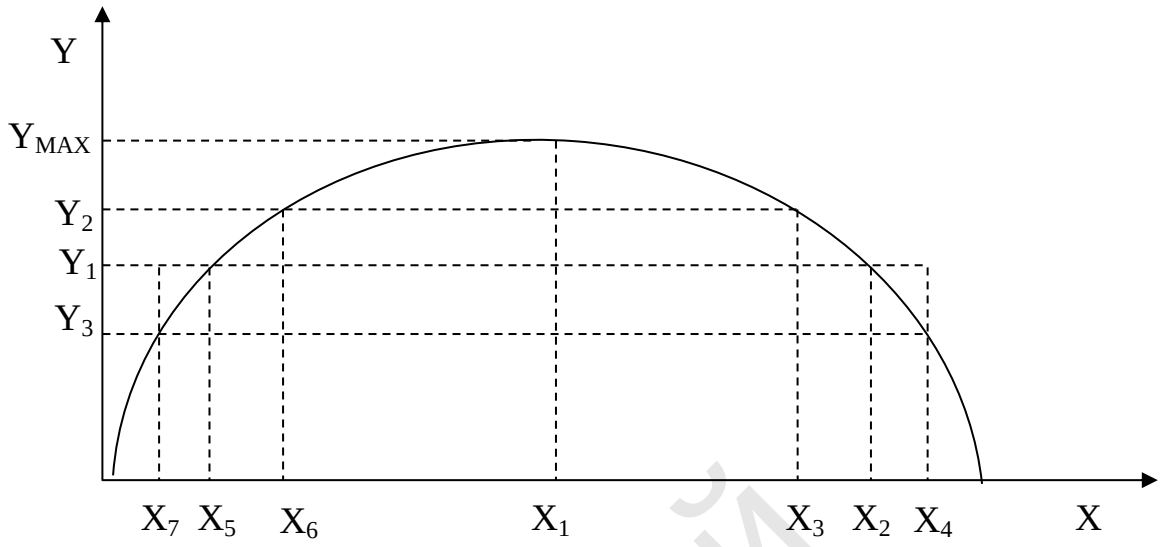


**Figure 1 – Use of renewable natural resources**

As a result, the preference for stock $X_5$ is potentially dangerous, since in case of an accidental reduction in the resource (for example, the impact of natural disasters or man-made accidents) it will lead to its reduction and high costs of subsequent recovery. Thus, the preferred option which is characterized by relative stability is the stock $X_2$. The option of maximizing resource renewability $Y_{MAX}$ is unstable, as in the case with $X_5$.

If the agricultural production system remains unchanged, the choice of land usage regime depends on level of the current stock (soil fertility level). In our opinion, it's necessary to use the principles of the theory of welfare.

The neoclassical economic theory of welfare substantiates the economic interrelations that ensure the growth of social welfare on the basis of the establishment of limited conditions for maximum economic efficiency. There are several basic conditions for maximum economic efficiency. The condition of optimal production requires adherence to equality of marginal rates of substitution for each pair of production resources for all firms in the industry producing a homogeneous product. Under conditions of scarce resources this means the same economic efficiency in the usage of each resource and the optimal intensity of usage of production resources as a whole. The condition of the optimal point in time means equality of the marginal relations of the received goods to each resource in the present and future. Under conditions of the free prices intensity of resources usage should be the same [2].

However, the prevailing market conditions do not take into account climate changes in the location of production and changes in the intensification of resource use. Perhaps such a reaction will follow in the future, but there is high probability of significant time lag. We can see this result on fig. 2

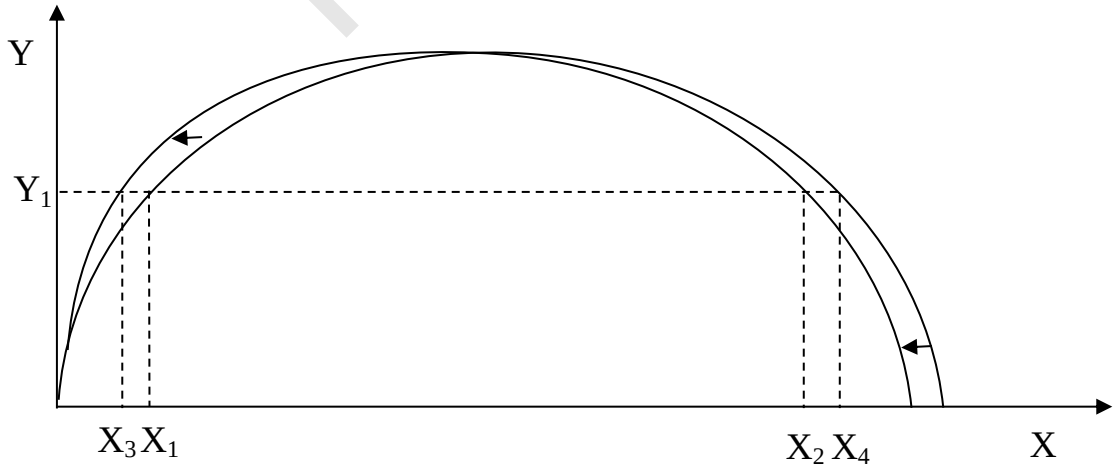


**Figure 2 – Reduced resource renewability after changes**

Supposing economic agents still count on the pace of recovery of $Y_1$. But changes in the biological and biochemical processes in the soil decrease possibility of renewability, so that the curve shifts to the left. In the original version, this assumed the preservation of reserve stock in the amount of $X_1$ or $X_2$. As a result, the level of renewability in both cases is reduced. In dynamics, this leads to an increase in the risk of degradation over time, which upsets equilibrium.

To summarize, it can be concluded that over time, regular revision of the agricultural production system is necessary, since the condition for sustainable development tends to be disturbed.



***References:***

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2. Blaug M. Economic Theory in Retrospect Cambridge University Press. 1997 г. – 751 p.