SECTION 10.
AGRICULTURAL SCIENCES AND FOODSTUFFS

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THE ROLE OF SOIL PROTECTION AGRICULTURAL LANDSCAPES IN PRESERVING AND INCREASING THE PRODUCTIVITY OF LANDS

Solving the problem of preserving and increasing the productivity of lands used in agricultural production is possible only under the condition of creating soil protection agro-landscapes [6, 8, 11, 13, 26]. Anti-erosion protection is a kind of "zero" cycle, the foundation of the entire structure of the agricultural landscape, the degree of reliability of which must correspond to the degree of erosion danger [5].

Blocks of conceptual models of agro-landscapes are determined by soil-climatic, geomorphological conditions, degree of erosion danger and other characteristics of large agricultural regions of Ukraine. Thus, a general scheme of the process of designing agro-landscapes is drawn up [3, 6, 10]. According to the results of the pre-project survey, all the necessary characteristics of the territory that will be agro-landscape regulated should be obtained. The list of parameters is determined by the mathematical model of erosion, which is used as a calculation tool during design. It is the erosion model that determines all stages and specifics of project operations [4, 7, 25].

When developing an anti-erosion protection project, it is necessary to solve at least two tasks: 1) to ensure reliable protection of the soil from erosion, which provides the necessary conditions for reproduction of its fertility; 2) to provide a quick payback of the funds spent on soil protection measures. The width of the working area, structural features of the surface runoff infrastructure, hydrotechnical structures and forest strips are calculated on the basis of the erosion model [9, 11, 27].

The mathematical model of erosion as a calculation quantitative base should be verified as much as possible and adapted to the conditions of the territory that will be regularized. All modern erosion models can be used only in interactive computer mode. In order for the design process to be automatic, a software solution for the computer distribution of the territory, organized by measures of permanent action (hydraulic structures, forest strips, infrastructure elements for discharging excessive surface runoff, roads, etc.), as well as the compilation of a technological process for each allocated working area, is necessary [2, 7, 29].

At the same time, the system of field protection forest strips should solve the main tasks:

1) Anti-erosion protection.

2) Achieving the maximum possible improvement of hydrotechnical parameters of the surface layer of air and the active surface of the soil as a result of its agromelioration effect. This will make it possible to provide more favorable conditions for moistening plants, reduce the negative effect of atmospheric and soil droughts and droughts.

3) Perform the role of guides in the implementation of agrotechnical operations [1, 5, 6, 12].

However, despite the rather high anti-erosion and hydrological effect, the anti-erosion function of field protection forest strips is not relied upon. Forest strips are unable to retain surface runoff during periods of extreme water discharge. Therefore, in the engineering approach to the design of anti-erosion protection, the main anti-erosion load should be carried by anti-erosion hydrotechnical structures [1, 23, 24].

The creation of agricultural land is preceded by the destruction of natural landscapes. Agricultural lands are post-landscape formations, "remains" of natural landscapes, which continue to be destroyed by modern agricultural production [8, 9, 30].

For the use of the term "agrarian landscape" to be justified, the land must have high ecological stability, the greatest possible capacity for self-regulation and even self-regeneration. At the initial stage, it is necessary to get rid of the processes that destroy the natural resource potential. Agrarian landscape is an integrated anthropogenic and natural, naturally productive territorial system, economically efficient and ecologically rational [5, 11, 18, 31].

It is obvious that the agrarian landscape cannot be created at once (immediately), as a result of some complex of works limited in scope and time. That is why land use should be transferred to the agro-landscape way of development.

The very first stage of agro-landscape development is the cessation of anthropogenic accelerated processes of erosion (water erosion) and deflation (wind erosion) of the soil. If at the time of the creation of agricultural lands on the site of natural landscapes, fertile soil was the first natural condition of agricultural production, then in the process of agricultural use, the soil increasingly becomes its social condition as well. But this relic of the natural landscape in Ukraine (as well as in the world as a whole) is being destroyed everywhere and with catastrophic intensity [4, 14, 15].

Soil protection meliorative measures of permanent action are almost the only possible effective means of creating a soil protection meliorative spatial structure of the agrarian landscape and its consolidation. The permanent long-term effect of such measures fundamentally distinguishes them from technological measures, the effect of which is fleeting in time (the exception is the permanent vegetation cover of natural fodder lands) [8, 16, 17, 19].

Functionally, the most important for the agrarian landscape (mandatory elements of the minimized structure) are the following groups of permanent measures:

a) anti-erosion along the slope (concentrated) links of the drainage infrastructure of the agrarian landscape. These links divide the slope into sectors, each of which is transformed into a slope block of contour-strip working plots (arable or pasture) [6, 9, 11, 28].

b) field protective forest strips, which, in addition to their main field protective (and anti-deflation) role, perform an equally important landscape-organizational, landscape-structural function of fixing the borders of strip production working areas (on slopes - cross-slope safe drainage boundaries of contour strip working areas) [1, 12, 22, 32].

The measures of permanent action of the named two groups form the primary spatial structure of the agrarian landscape. It is precisely such a structure that must be designed and implemented without fail: firstly, so that no significant changes occur during its long-term operation (at least the life span of the field protection forest strips, including after their possible regrowth); secondly, that the designed structure should be suitable for adding to it even without special design of system elements of the secondary spatial structure [2, 3, 5, 10]. These are measures of permanent action of the third important group, which consists of:

в) Drainage anti-erosion hydrotechnical structures. Together with the contour drainage arable nanorelief of the entire surface, they make up the field (ubiquitous, dispersed) link of the drainage infrastructure of the agrarian landscape [19, 20, 21].

Conclusions. When designing technological soil protection elements of the agricultural landscape, you must remember:

a) for natural reasons (especially due to the dynamics of changing weather conditions), soil protection measures are not always feasible and not always effective, and the duration of their effect is limited in time;

b) in real economic conditions, it is not always possible to implement the entire set of necessary anti-erosion measures;

c) permanent restoration of drainage contour nanorelief is possible only in contour-strip working areas;

d) soil protection measures can reduce the harvest or lead to a decrease in profit in the economy;

e) soil protection technology is unable to provide soil protection in cases of "natural disasters". It is they who cause significant erosional and deflationary damage.

Therefore, soil-protective rational production technologies are absolutely necessary and irreplaceable, but they should be applied within the ecologically strict framework of the landscape stable soil-protective meliorative spatial structure of the agrarian landscape. Relying only on soil protection technologies and special soil protection measures can lead to fatal consequences.

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