Chapter 11
The Methodology of Technical and Economic Justification for the Construction of Irrigation Systems to Prevent and Reduce Risks in Agriculture

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ABSTRACT

The methodology for developing the technical and economic justification for the construction of irrigation systems is presented, based on a multidisciplinary approach. The goal of this approach is to provide a thorough and persuasive rationale for the implementation and construction of irrigation systems to reduce risks in agricultural practices and enhance agricultural productivity, considering a complex array of influencing factors. This approach involves quantitative modeling of various scenarios with different sets of parameters that characterize the state of irrigation management taking into account the increased level of agricultural production considering climate changes, natural moisture conditions, soil characteristics, crop structures, irrigation methods, types of irrigation equipment, efficiency coefficients of irrigation systems, etc. The development of the technical and economic justification is considered using the example of land use by the State Enterprise "State Farm "Pioneer" in the Kherson region.

BACKGROUND

Amidst the ongoing armed aggression by Russia, Ukraine is confronted with a serious challenge of escalating threats, demanding immediate action not only to protect the lives of the population and the environment but also to establish stability and food security in the country. This course of action aligns with the overall direction of the UN Food and Agriculture Organization (FAO) Strategic Program for the period 2022-2031 (Strategic Program 2022-31, 2021). This vision entails joint efforts to achieve the Sustainable Development Goals by 2030 through transitioning to more efficient, inclusive, resilient, and sustainable agrifood systems (Agrifood Systems Transformation, 2023; FAO Report, 2023), with a primary focus on improving production quality, ensuring better nutrition, preserving the environment, and enhancing the quality of life for all. The Water-Energy-Food approach underscores the interconnectedness of water, energy, and food resources, highlighting the synergy between water, environmental, and agricultural policies (Kuzmych L. et al., 2022a; Romashchenko M. et al., 2023).

Modern conditions and prospects for irrigation use in Ukraine require a comprehensive approach to solving the problem of efficient use of water and land resources within integrated technological modules of irrigation systems. The issue of ensuring resource efficiency in irrigation needs addressing both when using irrigation within existing irrigation systems and when developing plans to restore former irrigation areas. Currently, farmers place high hopes on the government's program for the restoration of on-farm irrigation systems and attracting investments for this purpose

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