Chapter 2
Formation of Water Demand for Drained Lands in Variable Climatic and Agricultural Land Reclamation Conditions

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ABSTRACT

The chapter provides information on crop evaporation and water consumption during different growth stages, influenced by prevailing weather and climate conditions.

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This data serves as the basis for designing and implementing effective water regulation strategies. The authors conducted an assessment of the weather and climate in Western Polissia of Ukraine, and performed computer simulations of diverse climate scenarios. These simulations were based on comprehensive forecasts and models, considering key parameters of hydro-melioration systems, local climatic conditions, water management techniques, and the productivity of drained lands under various natural, agronomic, and reclamation conditions. Long-term forecasts were utilized to determine the vegetative values of total evaporation and the water demand of drained lands under changing weather and climatic conditions. Additionally, the authors evaluated the technological efficiency of different methods for moistening drained lands.

BACKGROUND

The research holds significant relevance due to the pressing issue of global climate change affecting regions worldwide, including Ukraine. These changes directly impact the functioning of hydro-melioration systems and crop cultivation conditions. Agricultural production, particularly on lands with regulated water regimes, is intricately tied to meteorological conditions. Therefore, timely information on anticipated climate changes is crucial for decision-making (Abrantes et al, 2018; Malézieux et al, 2009; Prasuhn et al, 2013; Wallander et al, 2021).

The current stage of agricultural development, especially on lands with regulated water regimes, presents several unresolved challenges. There is a lack of sufficient methods to assess the ecological and economic feasibility of implementing remedial measures considering climate change. Hence, there's an urgent need to understand the projected consequences of global climate changes and make adaptive decisions to mitigate their impacts (Dickeyet al, 1981; Eekhout et al, 2018; Kuzmych et al, 2022a,2023a, 2023b,2023c; Rokochinskiy et al, 2019, 2020; Turmel et al, 2015; Yakymchuk et al, 2022; Yan Xin et al, 2023).

For drained territories with shallow groundwater tables, weather and climate conditions play a vital role in shaping soil and groundwater conditions, influencing soil processes during crop growth stages. Projected temperature increases and heightened aridity due to climate change will likely reduce natural moisture levels and increase water demands for crop cultivation on drained lands. Consequently, additional irrigation technologies will be required to supplement moisture levels. Thus, understanding the total water demand for cultivated crops and its variations is essential for designing effective water regulation strategies in response to climate change. This involves selecting and justifying appropriate water regulation methods, structures, and operational modes for drainage systems, along with calculating their