Chapter 10
Analysis of Moisture Deficit in the Kherson Region Within the Context of Climate Change

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ABSTRACT

Developing a predictive system for water deficit analysis in the Black Sea Lowland, especially in climate change, involves integrating various data sources, modeling techniques, and technological tools to forecast water availability and demand. The analysis of the change in moisture deficit in the Kherson region is provided for the period from 1955 to 2022. A description of temperature gradients across the Kherson region is provided. The distribution of precipitation throughout the years in terms of quantity and intensity is provided. As part of the Black Sea Lowland, the Kherson region is critically important for southern Ukraine's agriculture and water security. Given the region's reliance on irrigation and the challenges posed by climate change, developing a predictive system for water deficit analysis is essential.

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Such a system can help stakeholders make informed decisions to ensure sustainable water management and mitigate the adverse effects of water scarcity.

BACKGROUND

As part of the Black Sea Lowland, the Kherson region is critically important for southern Ukraine's agriculture and water security. Given the region's reliance on irrigation and the challenges posed by climate change, developing a predictive system for water deficit analysis is essential (Korobiichuk et al, 2017; Kravchenko et al, 2017; Kuzmych et al, 2022a,, 2023f; Land reclamation, 2015; Romaschenko, 2019; Yakymchuk et al, 2022).

The agricultural production in the Kherson region, particularly its irrigated agriculture sector, faces challenges due to complex soil and climatic conditions. The region experiences insufficient and unstable natural moisture, with low precipitation levels and high evaporation rates leading to a moisture deficit. This results in frequent droughts, long periods without rain, and significant yield fluctuations, impacting agricultural productivity (Kravchenko et al, 2017; Kuzmych et al, 2022b, 2022c,, 2023a; Land reclamation, 2015; Rakushev, 2017).

The Kherson region, located in the Steppe agro-climatic zone, covers an area of about 27.5 thousand km^2. It is characterized by an arid and moderately hot climate, with a flat relief and limited water bodies. The region relies on irrigation to improve agricultural conditions in the face of inadequate natural moisture.

The region's economy heavily depends on agriculture, focusing on grains, vegetables, and fruits. Water resources, including the Dnipro River and canals, are crucial in irrigation and municipal water supply. However, overuse of groundwater resources and the impact of climate change, such as rising temperatures and changing precipitation patterns, pose challenges to water availability for agriculture (Kuzmych et al, 2022e,, 2023b, 2023c; Shevchenko et al, 2019; Zima, 2010),

Efficient water management and predictive systems for water deficit analysis are essential to sustain agricultural productivity, ensure food security, and support economic development in the Kherson region. Proactive planning and strategies to address water scarcity risks are necessary to mitigate the impact of water shortages on agriculture and the economy.