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# DEVELOPMENT OF A METHODOLOGY FOR IDENTIFYING DROUGHT-PRONE AREAS REQUIRING URGENT IRRIGATION MEASURES

**Abstract**

In the face of global climate change and the instability of water resources, developing a methodology that allows for the timely detection and assessment of drought-prone areas becomes a key task for maintaining the stability of agriculture and natural ecosystems. Our study focuses on the creation of an innovative methodology based on the comprehensive analysis of satellite data, meteorological observations, and vegetation indices.

First and foremost, various types of data were analyzed to develop the methodology, including information obtained from satellite observations such as surface temperature, soil moisture, and vegetation indices. This comprehensive approach enables us to gain a deep understanding of the dynamics of changes in the natural environment and identify drought-prone areas.

The foundation of our methodology lies in the use of geographic information systems (GIS) and machine learning algorithms. GIS allows us to conduct spatial data analysis and create maps of drought distribution, while machine learning algorithms assist in forecasting the further development of drought based on historical data and current trends.

An important stage in the development of the methodology was the determination of criteria and threshold values that accurately identify drought-prone areas depending on the climatic and landscape characteristics of the region. This ensures the adaptability of the methodology to various conditions and enhances its accuracy.

To verify and further refine the methodology, data on actual cases of drought over the past ten years were utilized. This allowed us to assess the effectiveness of the analysis algorithms and refine the predictive models.

Special attention is given to the development of a user interface and notification system, making our methodology accessible to a wide range of users, including farmsteads and water resource management authorities. Integration with existing systems for managing agricultural measures and irrigation systems enables timely response to identified drought-prone areas and automates the irrigation process.

Overall, the results of our study demonstrate the high effectiveness of the developed methodology for the timely detection of drought-prone areas and irrigation planning. This contributes to increasing the resilience of agriculture to climate change and the more rational use of water resources.