

MODEL COMPLEX OF INFORMATION SYSTEM “GIS POLIV” AND REMOTE SENSING DATA USE TO ADJUST MODEL PARAMETERS

V. POLISHCHUK, O. ZHOVTONOG, A. SALIUK, Y. A. BUTENKO,
K. CHORNA

*Institute of Water Problems and Land Reclamation NAAS, Kyiv, Ukraine,
PI «Institute of Environmental Economics and Sustainable Development of the
National Academy of Sciences of Ukraine», Kyiv, Ukraine*

Introduction. Evapotranspiration (ETa) is the basis of all calculations related to the planning and water resources use. Agricultural field water use consists of evaporation from the soil surface and transpiration of the vegetation cover. It is difficult to measure in agricultural fields so it requires the calculations. For some fields, experimental indicators can be obtained by water-balance, physiological methods, with the help of evaporators or other field types of equipment. These methods have some disadvantages - they characterize the ETa based on point data, which cannot provide a good estimation of ETa in large areas. To solve these problems information system (IS "GIS Poliv") for operational irrigation planning for farms was developed.

Materials and methods. IS "GIS Poliv" uses in its composition well-known models and algorithms for irrigation planning, uses innovative technical means of on-site and remote sensing monitoring for the state of crops and soils, geoinformation technologies to represent the spatially distributed data.

Results and discussions. To control the accuracy of the calculation and to correct the parameters of the IS "GIS Poliv", namely the actual values of ET and the dynamics of the soil moisture, soil moisture are determined according to the data of the measurement. In case the simulation error exceeding 10 mm, the normative crop coefficients are corrected or they are replaced by the actual values obtained during the water balance calculations according to the soil moisture measurement data or according to the RS data. The special algorithm was developed to adjust the parameters of the model in IS "GIS Poliv".

Conclusions. IS “GIS POLIV” allows to receive (daily) operational information on the dynamics of soil moisture and crop evapotranspiration in graphical, cartographic and tabular form; to receive recommendations on operational plans for irrigation of crops and water supply in the farm via the Internet; to evaluate the efficiency of water and energy resources use in irrigation.

The IS “GIS POLIV” provides an increase of crops on irrigated fields up to 10% at observance of modern technologies of cultivation of crops and recommendations on irrigation scheduling; saving water and energy resources at the level of 5-20% by eliminating unprofitable waterings; minimizing or eliminating the negative impact of irrigation on soil fertility and the environment.