



A GIS based district information system for water resources management and planning

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In many watersheds of the Mediterranean Countries, water resources are presently fully or overcommitted. Irrigators are the largest consumers of fresh water in Mediterranean Countries using up to 80% of all allocated water in some regions. Administrative efforts should be directed towards an integrated policy of water allocation which accounts for the characteristics and specificity of each farm, requiring the availability of data bases and management tools (decision support systems) specifically designed to fulfil the objectives of maximizing water use efficiency. The overall objective of this program was the development of a District Information System (DIS) which could be used by stakeholders at purposes of irrigation district day-to-day management as well as for planning and strategic decision-making. The DIS was developed from a GIS-based modelling approach which integrates a generic crop model, a hydraulic module for the water transfer/distribution system and uses remote sensing information. The main sub-objectives were: (i) the development of an operational algorithm to retrieve crop evapotranspiration from remote sensing data, (ii) the development of an information system with friendly user interface for the data base, the crop module and the hydraulic module and (iii) the analysis and validation of management scenarios from model simulations predicting the respective behaviour.

Surface Energy Balance Algorithm for Land (SEBAL) was used to derive monthly actual evapotranspiration (ET) values from Landsat TM imagery. Meteorological data from the archive of the Institute for Research and Technology, Thessaly (I.RE.TE.TH) have also been used. The methodology was developed using high quality Landsat TM images during 2007 growing season. Monthly ET values are then used as an input to CROPWAT model. Outputs of CROPWAT model are then used as input for the hydraulic module consisted of TECHNOLOGISMIKI, WATERCAD and WEAP model. Hence, a reference scenario was developed based on the actual situation of the surface irrigation network of the Local Administration of Land Reclamation (LALR) of Pinios river in Greece (Pinios LALR) for the year 2007. The system was calibrated with observed data of that year and the district parameterization was conducted based on the actual operation of the network. Hydraulic model output showed that the water pumped from Pinios LALR is not enough to serve irrigation requirements. Furthermore, the water evaluation and planning model (WEAP) respectively projects the same output since water demand is not covered. Four alternative scenarios were developed to be studied with the DIS: (a) Reduction of channel losses, (b) Alteration of irrigation methods (c) Introduction of greenhouse cultivation and (d) Operation of the future Lake Karla network, this network is designed to fulfil the irrigation needs of agricultural land around the reconstructed Lake Karla reservoir and the water is pumped from the Lake Karla reservoir and is being distributed through a low pressured piped network. The results showed that the water demand variants according to the scenario in study. Simulation of the four alternative scenarios indicated that the alteration of irrigation methods scenario mainly increases the efficiency of the irrigation network.