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Online decision support system for surface irrigation management

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Irrigation has played an important role in agricultural production. Irrigation decision support system is developed for irrigation water management, which can raise irrigation efficiency with few added engineering services.
An online irrigation decision support system (OIDSS), in consist of in-field sensors and central computer system, is designed for surface irrigation management in large irrigation district. Many functions have acquired in OIDSS, such as data acquisition and detection, real-time irrigation forecast, water allocation decision and irrigation information management.
The OIDSS contains four parts: Data acquisition terminals, Web server, Client browser and Communication system. Data acquisition terminals are designed to measure paddy water level, soil water content in dry land, ponds water level, underground water level, and canals water level. A web server is responsible for collecting meteorological data, weather forecast data, the real-time field data, and manager's feedback data. Water allocation decisions are made in the web server. Client browser is responsible for friendly displaying, interacting with managers, and collecting managers' irrigation intention. Communication system includes internet and the GPRS network used by monitoring stations.
The OIDSS's model is based on water balance approach for both lowland paddy and upland crops. Considering basic database of different crops water demands in the whole growth stages and irrigation system engineering information, the OIDSS can make efficient decision of water allocation with the help of real-time field water detection and weather forecast. This system uses technical methods to reduce requirements of user's specialized knowledge and can also take user's managerial experience into account. As the system is developed by the Browser/Server model, it is possible to make full use of the internet resources, to facilitate users at any place where internet exists.
The OIDSS has been applied in Zhanghe Irrigation District (Center China) to manage the required irrigation deliveries. Two years' application indicates that the proposed OIDSS can achieve promising performance for surface irrigation. Historical data of rice growing period in 2014 has been applied to test the OIDSS: it gives out 3 irrigation decisions, which is consistent with actual irrigation times and the forecast irrigation dates are well fit with the actual situations; the corresponding amount of total irrigation decreases by 15.13% compared to those without using the OIDSS.