IRRIGATION MANAGEMENT INFORMATION SYSTEMS IN THE WEST: CAPABILITIES AND CHALLENGES

EXECUTIVE SUMMARY

Weather Station Networks and specifically Irrigation Management Information Systems (IMIS) provide essential data that can be used to calculate the day-to-day water requirement for a given crop. When these evapotranspiration (ET) products are adopted and used more widely, they have the potential to greatly improve agricultural water use efficiency across the West. A number of larger weather station/IMIS networks are operated across the western United States consisting of weather stations which measure temperature, solar radiation, wind speed, and humidity, among other variables, which are then used to estimate ET.

The Western States Water Council (WSWC) and the California Department of Water Resources (CDWR) co-hosted a survey and workshop to learn more about the capabilities and operation of selected, larger weather station networks that also operate as IMIS. The meeting helped the attendees gain a greater understanding of data collection, quality control techniques, dissemination, and adoption rates and usage of IMIS data in general and ET data products specifically. It also served to explore the networks' potential compatibility with the California Irrigation Management Information System (CIMIS), a network owned by CDWR that could serve as a software platform for others. Results of the survey and workshop presentations and discussions identified data gaps, and assisted in determining what resources may be available or needed by the networks for more regional collaboration.

BENEFITS

Network operators and managers reported a variety of users/applications which rely on their data and data products. These include growers and agricultural consultants in irrigation scheduling, fertilizer application, and pest management; water agencies and public agencies for estimating water consumption; home owners for lawn irrigation; and by researchers who are exploring weather patterns or water consumption, or modeling irrigation strategies. The data are also used in firefighting, air quality monitoring, weather forecasting, and engineering designs. These applications result in several benefits, including: mitigating impacts of drought/climate change, improving the environment and the landscape, producing greater and higher quality crop yield, conserving water and helping to meet conservation goals, and reducing costs of energy and water for the grower.

COLLABORATION

Increased collaboration between managers and coordinators of weather station networks and IMIS may help overcome difficulties caused by differences in quality control methods or maintenance/calibration standards (such as differences in data accuracy). The WSWC encourages participation and funding for meetings such as the Western Extension Research Activity (WERA) workshops, where network managers and operators discuss challenges and work together to share information and establish uniform standards.

CHALLENGES

IMIS networks face a number of challenges which affect the operation of the networks and dissemination of data including:

- Limited Funding Resources – used for station installation, maintenance costs, data management/IT, and personnel salaries. Availability of funds impacts the amount of maintenance, quality assurance, and analysis that can be done by those who manage the network.
- Differences in Standards – different policies for maintenance and calibration creates potential problems in sharing data with other networks.
- Station Maintenance/Sensor Failure – damage to weather stations and failure of individual sensors results in poor data/loss of data. The unscheduled failure of sensors may require additional resources for maintenance technicians or partnerships with local entities who can perform needed maintenance.
- Station Siting – many networks are unable to install stations in areas with ideal pitch/crop conditions. Local conditions may have a significant impact on the accuracy of parameters used to calculate ET, however there are several obstacles to obtaining ideal siting conditions including finding willing partners with suitable crop types, changing crop types/irrigation practices due to research needs, and ease of access for technicians.
- Public Outreach –there are a few obstacles to data implementation and public understanding, which may be overcome by increasing awareness of the intended users (primarily growers) of the available IMIS data and IMIS data-dependent tools.

THE FUTURE OF WEATHER STATION/IMIS NETWORKS

Weather station and IMIS networks are growing to meet user needs, enhancing data products, increasing the number of applications offered, and adapting to available funding resources. A primary focus of the workshop attendees for future development is on establishing consistent standards for maintenance, calibration, and quality control of data. This is especially important for strengthening the partnerships between networks and ensuring the integrity of data.

These networks are also moving toward greater consistency when estimating and reporting ET. Currently, networks use a variety of methods (or modifications of the standard American Society of Civil Engineers (ASCE) Penman-Monteith method) to calculate ET, and may report one or more of these values to users. This can cause confusion for end-users and can also be problematic when data are shared across networks, or when those data products are aggregated to create tools for policy-making or management decisions. Most networks plan to move toward reporting only the standardized method.

Additionally, many weather station and IMIS networks are planning on physically expanding (i.e., installing additional stations) and expanding their data products offerings, such as crop-specific ET estimates and forecasts, and other data-derived tools such as irrigation scheduling applications.