

## **Water Budget Model Validation and Outreach Program: Sensor Wise Irrigation Monitoring (SWIM) Network**

A number of ideas have recently been discussed during meetings of the KFB Water Management Working Group to calculate water budgets for various watersheds in Kentucky where interest is high in carefully managing the resource to ensure long-term availability for agricultural irrigation and other uses. These ideas involve using a numerical (computer) modeling approach to estimate various components of the water budget of surface watersheds. While models are useful for predictive purposes, the accuracy of the hydrologic estimates obtained is dependent on the quality of input data. Moreover, all hydrologic models incorporate certain assumptions about the processes they simulate; therefore *the accuracy or veracity of the model's output can only be assessed with actual field observations or measurements.*

A general water balance equation has the following hydrologic components:

Precipitation = streamflow + evapotranspiration +/- groundwater storage +/- soil moisture

Unfortunately, field observations needed to properly quantify these components are not available for most parts of the state. Most, if not all, of the parameters that make up a water balance model are not collected at a scale needed to help producers make management decisions. For example, the most important parameters to a crop producer—evapotranspiration and soil moisture, are almost always estimated or modeled.

We suggest that a better approach to developing a water budget in the most irrigated area in Kentucky, the Jackson Purchase, would be to begin collecting field observation data before or concurrently with hydrologic model development. By direct measurement of all specific water budget parameters needed for current and projected cropping systems, we can develop or verify and improve the accuracy of water budget models to a level that will benefit producers in their land use management decisions.

We propose a network of 4 to 8 Sensor Wise Irrigation Monitoring (SWIM) Networks within stream-gauged watersheds on representative production farms in key soil-physiographic regions of the most irrigated region of the state, the Jackson Purchase. At these intensively monitored sites we will monitor all parameters that make up a water budget at the field scale. This will include groundwater, soil moisture conditions within the crop root zone, crop water use and yield, precipitation and runoff. Collectively, data from these sites will validate and or be the basis of a regional model that will be much more useful to a producer than a water budget that uses a considerable amount of assumptions with little to no actual regional- or site-specific data.

By hosting Sensor Wise Irrigation Monitoring (SWIM) Network workshops and field days, the University of Kentucky Cooperative Extension Service will extend the knowledge gained from these ground referenced model validation points and bring producers into the discussion about how this information can be used to make irrigation management decisions on their farms.

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