Arkansas Water Plan Update

Agriculture Water Demand and Forecasting Technical Work Group: Agenda, Approach, and Key Questions

Conference Call - January 7, 2013 from 2:00 p.m. – 4:00 p.m.

Meeting Purposes:

1. Provide a more detailed overview of the draft agricultural water demand forecast methodology.
2. Identify and discuss major factors ("drivers" if any) to include in the quantification of current and future agricultural water use for irrigation and livestock.
3. Obtain support from the Agricultural Demand Technical Working Group to have CDM Smith begin the path forward in the development of the scenarios and assumptions, and completion of the draft agriculture water demand forecast.

The role of the Technical Working Group is to review the draft methodology, provide input and information, and work with the consultant to develop the draft agricultural water demands for the Arkansas Water Plan Update.

Agenda:

2:00 p.m. – 2:15 p.m. –	Review of December 17th demand methodology meeting
2:15 p.m. – 2:45 p.m. –	Outline of agricultural water demand forecast methodology, available data, and preliminary assumptions
2:45 p.m. – 4:00 p.m. –	Discussion/Questions

Initial Approach and Assumptions

It should be noted that the draft methodology white paper is to serve as an initial outline for approaching water demand forecasting for the Arkansas Water Plan Update. Any assumptions presented may be adjusted or revised based upon the input and expertise of the Technical Working Group and incorporation of data and new information as we conduct data collection and analysis.

Forecasting water demand for any water use sector is complex. However, if one steps back there are realistically only three plausible overall outcomes.

Water use for irrigation and livestock will:

a. Increase
b. Remain the same
c. Decrease

Gaining insight into which of these three outcomes are more probable typically involves looking at past trends and quantifying any major drivers (see below for more information on drivers) that could impact total agricultural acreage, livestock counts, and changes in the water used per unit of production (acre and animal unit).

Current research reveals the following trends in Arkansas agricultural production, with considerations on how these trends might be incorporated into the forecast:

At a statewide level, irrigated agricultural acreage has doubled from 1987 (2.4 million acres) to 2007 (4.5 million acres) which is the highest value for irrigated acres recorded by the USDA Agricultural Census for Arkansas. This trend could be assumed going forward, providing one potential growth scenario, but could also potentially flag water resource concerns that may not be most probable when one examines possible drivers that would actually cause increases or decreases in overall water demand. It should also be noted that data for total crop land (irrigated and non-irrigated) will also be examined as part of the forecast effort.

Drivers are factors that could directly impact the demand for agriculture or significantly impact water use per unit of production. There are a large number of complexities that could affect the spectrum of agricultural drivers. Correlation of production to population is logical, however, given the world market for food production and the relative ease of transportation creates some uncertainties. Beyond demand for agriculture there are social and economic drivers that could be argued to create an atmosphere of either increasing or decreasing agricultural growth. A few factors that could impact growth of acreage include, but are not limited to: commodity price, fuel and production cost, availability of labor, availability of water, demographics and age of existing agricultural producers, competition with other demand sectors, urbanization, new or changing regulatory requirements, changes in national agriculture policies, land constraints, and/or changes in worldwide or national food consumption patterns. Potential changes in water use per unit of production add additional complexities.

It is anticipated that it will be difficult to establish specific probabilities of occurrence with any specific individual or combination of drivers and their associated effect (increase and/or decrease) on irrigated acreage, livestock inventories and/or water use per unit of production. With these points in mind, CDM Smith recommends the following as the starting point for the approach to the forecast:

a. Initial assumption - since there are factors that would drive both increases and decreases in total agricultural acreage, livestock, and water use - the baseline forecast is assumed remain constant during the planning horizon. Since 4.5 million acres represents one of the highest irrigated acreage years reported to date it will be initially assumed that 4.5 million irrigated acres will remain irrigated through 2050. Additionally, the maximum livestock count will also be assumed to remain constant.

If there are known project or plans that should be used to modify this assumption we would like to identify these as soon as possible (i.e., new livestock production facilities etc.)

b. Potential modification to this initial assumption (i.e., utilization of irrigated acreage and/or livestock count trend data at the statewide or county level etc.) will be evaluated during data collection to determine if there are geographic specific or other technical, social, economic or regulatory drivers that would warrant inclusion in the forecast methodology.

c. Once total irrigated acreage and livestock count is established the mix of crops and water use per unit of production will then be considered to determine what if any changes in crop or livestock mix might be most probable. Initially it is recommended that a single mix of crops and livestock be used during the forecasting horizon but will be considered for modification based on additional data collection and research.

It is important to emphasize that the goal is not to oversimplify the analysis. Past planning experience and research to date have not identified any major drivers that would significantly suggest an increasing or decreasing crop irrigation or livestock water demand forecast. Data collection and research will diligently seek to identify and quantify any major drivers that should be incorporated into the forecast. The remainder of this paper presents key questions and issues that will help refine these initial assumptions and/or to identify key drivers.

Key Questions/Discussion Items:

Crop Irrigation

- It is recommended that for the forecast, the baseline mix of supply sources (i.e., surface water vs. groundwater) remains constant into the future, unless a known project or plan has been identified that would affect this assumption. Using this approach, the potential water supply gaps will be delineated. If gaps are identified, alternate water supply source scenarios will be considered as part of the identification of solutions/management practices.
- Suggested sources of data for consideration for determining baseline irrigated acres by crop type.
    - USDA Agricultural Census (primarily “mailout and mailback” data collection)
    - USDA National Agricultural Statistical Service (NASS) annual data (rice, soybeans, and cotton only)
    - Arkansas Water Use Registration Database (WUDBS) (primarily self-reported by those with registered withdrawals)
    - Aerial imagery

- It is recommended that the following quantification method be utilized for forecasting future crop irrigation water demand:
    - crop irrigation water requirement *times* irrigated acres by crop type *divided* by efficiency factor
- Suggested sources for determining crop irrigation water requirements by crop type.
    - Observed diversions from the WUDBS (includes all water applied to crops)
    - Arkansas Division of Agriculture Cooperative Extension Service seasonal water use guides (may depict crop water requirement or irrigation water requirement)
    - Other literature sources
    - Research from other states (e.g., Mississippi, Tennessee, Oklahoma)
    - Is there significant regional variation due to climate or other factors?
- Preliminary sources of data for determining on farm system efficiencies (i.e., losses) by irrigation system type.
    - WUDBS withdrawal data compared to crop water requirement
    - Literature review
- Factors to consider in determining future crop production and irrigation patterns.
    - Are significant shifts in crop production that could impact the demand for water for irrigation expected? If so, what are some likely scenarios?
    - Will county and regional irrigation patterns hold true into the future? (i.e., will the baseline pattern of crop production remain relatively similar in the future?)
    - Are USDA national crop production projections through 2021 acceptable for projecting future crop production patterns in Arkansas?
    - As part of a reasonable high forecast scenario, is it appropriate to consider changes in temperature and precipitation trends?

Livestock

- It is recommended that the following quantification method be utilized for forecasting livestock water demand:
    - livestock water requirement *times* the livestock inventory

- Suggested sources of data for consideration for determining the baseline livestock inventory in Arkansas.
    - USDA Agricultural Census
    - Other source
- Factors to consider in determining future livestock production.
    - Are projections in national or global production and consumption appropriate indicators of future production in Arkansas? If not, what data is available to provide more realistic assumptions?
    - Are significant shifts in livestock production that could impact the demand for water for livestock expected? If so, what are some likely scenarios?
- Potential sources of data to obtain assumptions for livestock water requirements.
    - USGS estimates [national median estimates (2005)], Arkansas-specific developed by Terry Holland at USGS in 1992
    - U of A Division of Agriculture