

Water Matters

Published by the Nebraska Department of Natural Resources

A guide to **integrated water management** in Nebraska

INSIGHT

An Integrated Network of Scientific Information & GeoHydrologic Tools

By Stephanie Ashley, Jesse Bradley, P.G., and Laura Paeglis

Introduction

During the last century, Nebraska has faced a variety of challenges in meeting the competing demands on its water resources. Some of the challenges are caused by an excess of water such as flooding, and others are caused by shortages. So many interests are at stake. Farmers need water to irrigate their crops; residents of cities and towns require municipal water for their homes; and states are obligated to meet the demands of interstate compacts and agreements. It can be difficult to know where to start in managing water resources. Water managers are tasked with the challenge of first trying to understand the supply of water and all of the demands, and then trying to manage natural systems in such a way that everyone's needs are met.

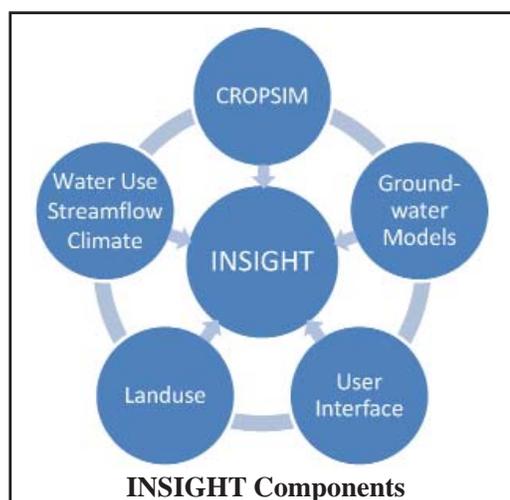
To assist water managers in these endeavors, the Nebraska Department of Natural Resources (DNR) will be launching INSIGHT, an Integrated Network of Scientific Information and GeoHydrologic Tools. INSIGHT will compliment and expand upon work already completed by DNR and the state's natural resources districts (NRDs).

Currently, water managers must gather data from a variety of sources. It is often complicated to associate records with their locations. Some agencies

store overlapping data that is difficult to correlate.

The development of INSIGHT will seek to overcome some of these issues, and provide a series of web-based interactive maps, freely available to the public, that are directly linked to basin specific data on water supply and demand. It will provide a single platform, a one-stop shop, where water managers can access hydrologic data and analyses maintained by the state.

The general public will also be able to access the data to better understand their own environment and local issues. The information will be organized by surface water basin so that citizens in each basin



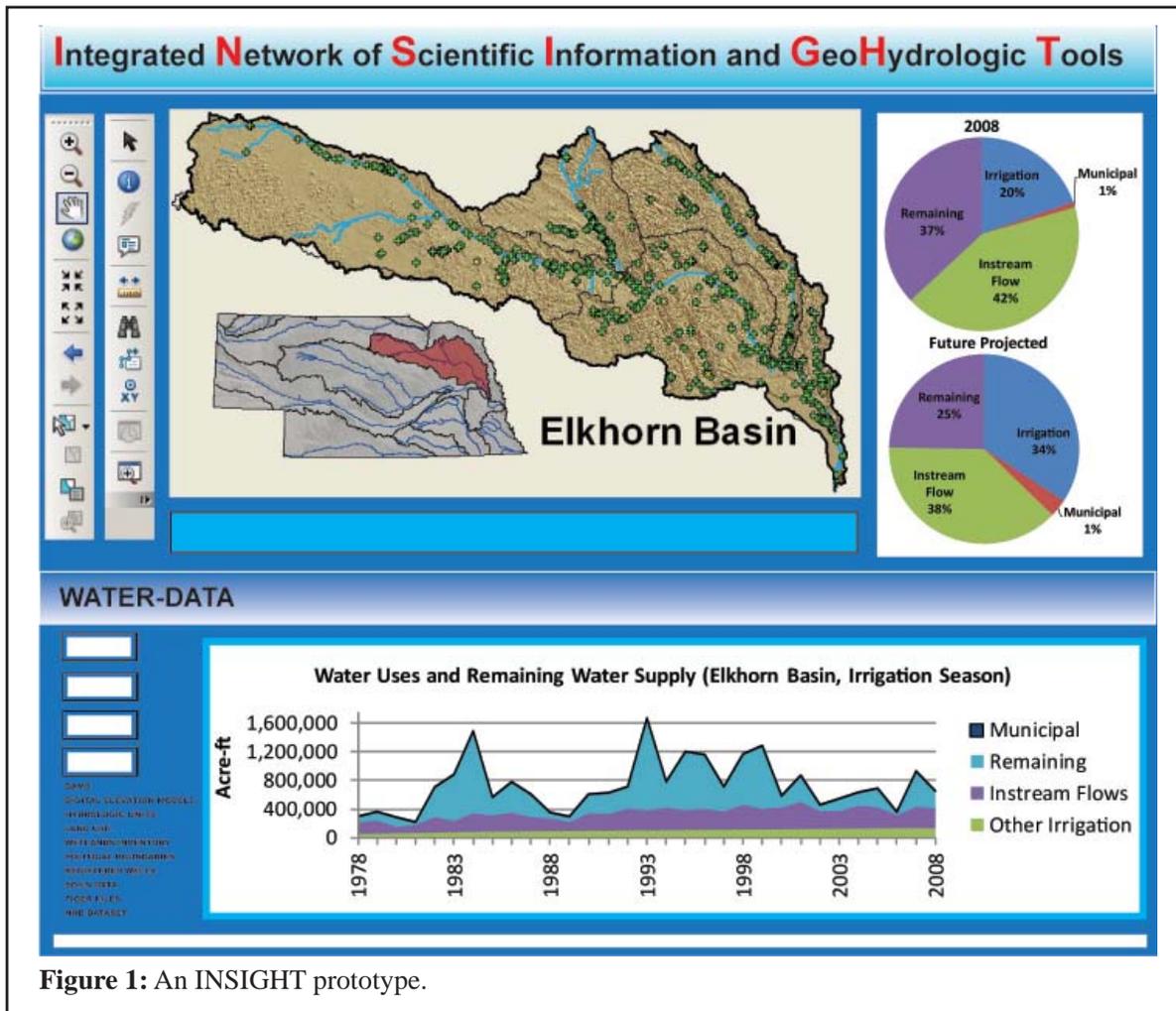


Figure 1: An INSIGHT prototype.

can easily find information for their area. The planned release of INSIGHT will be in July 2013. Figure 1 shows a prototype of what the INSIGHT web interface may look like after it is completed.

Vision

The final INSIGHT product will be a compilation of a wide array of information. The network will be built upon the valuable efforts and studies of the individual NRDs, and DNR will seek their input in developing and presenting the network. It is anticipated that there will be opportunities for DNR to partner with NRDs in building necessary tools and compiling data.

The anticipated product of INSIGHT is a series of web-based interactive maps. The maps will exhibit data spatially and describe analyses about water supply and demand in the basin. DNR and its contractors will be developing the layout of the website and interactive maps and the format in which data will be presented.

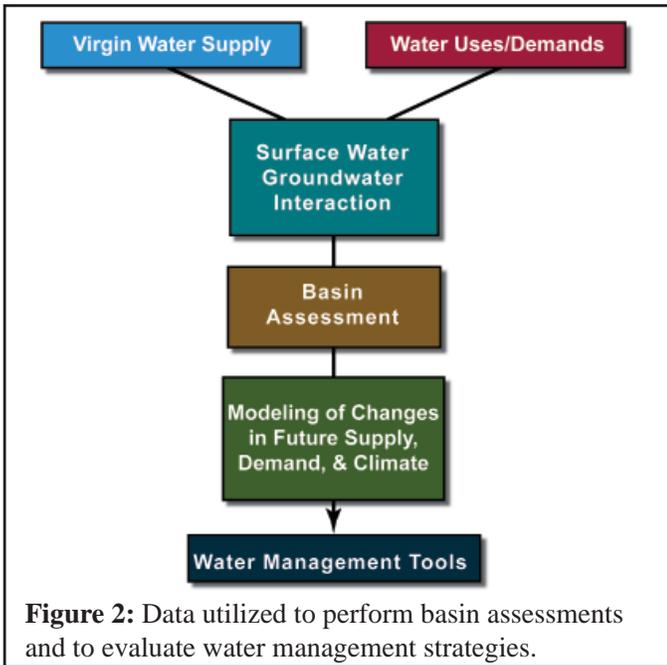
Purpose of INSIGHT

The purpose of INSIGHT is to provide useful tools and information to scientists, water managers, and the public. Many efforts have already been made to collect data and develop water management tools. INSIGHT will be a compilation of work being done all across the state in one location so it is easier to access, use, and understand. One of the principal objectives of INSIGHT is to aid water managers in understanding current and future demands, evaluating the effectiveness of water management strategies, and assessing the most critical areas of water shortage.

Types of Information Available on INSIGHT

INSIGHT will contain information about water supply and current water use. This will include data such as streamflow measurements, groundwater level measurements, meter data, and canal diversion records, among others.

It is not enough just to know the demands



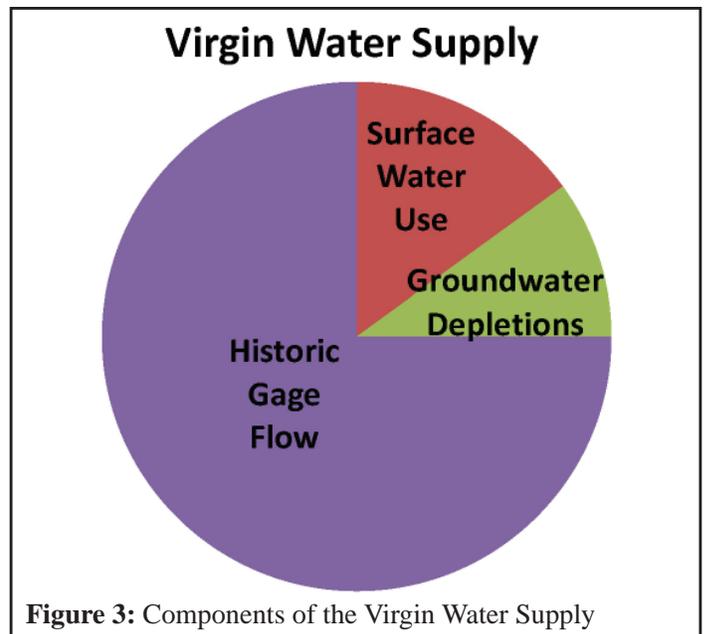
water would be available if there were no significant influences from human activities in the basin. This estimate is called the virgin water supply (VWS). It is calculated by examining historic streamflow as well as current streamflow, surface water use, and groundwater use (as determined by depletions). Figure 3 shows the components that make up the VWS.

It is also necessary to understand the demand on water supply. This includes instream flow demands, surface water diversions, and depletions caused by groundwater use. These demands can be modeled to help us understand how they interact and influence each other. Figure 4 shows an example of how water demands are estimated through time.

It is important to look at how supply and use have changed through time, not just in a moment, to understand the real balance that exists within a basin. INSIGHT will make it easier for water managers to access more information for a better understanding of the system and better decisions.

Summary of Progress

DNR, with the NRDs and some surrounding states, have developed a number of groundwater models for various regions in the state. Completed models include the Republican River Model in the Republican River Basin and the COHYST Model and Western Water Use Model in the Upper Platte River Basin. Models have also been built in the Elkhorn, Loup, Lower Platte, Lower Niobrara, and Blue River



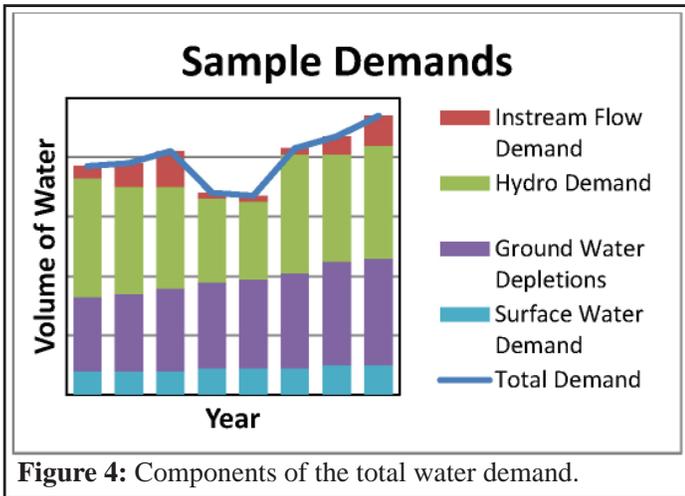
on groundwater and surface water separately. It is necessary to understand how groundwater and surface water interact. For example, when water is pumped from a well, it will eventually impact nearby streams and rivers, but the effects are not immediate and may be difficult to calculate. When crops are irrigated, some of the water is used by the crops, some runs off back into nearby streams or canals, and some is absorbed back into the groundwater system.

DNR uses various models to help quantify the effects of different water uses. INSIGHT will include the results of modeling efforts to provide information on these interactions. This modeling should help users understand how uses work together to affect the total water supply.

Use of Information Available on INSIGHT

DNR will be using the groundwater models and other tools to perform basin hydrologic assessments in all of the state’s major river basins. The results of these assessments will be linked into INSIGHT. The data that will be used to perform these analyses are shown in Figure 2.

The models and tools developed to assess basin status currently can also be used to help understand the supply and demand on water resources into the future. They will be available through INSIGHT. An understanding of the water supply is accomplished by first estimating the initial supply, or how much



Basins. These models may need some modifications to be used in the basin assessments and they are currently being refined as needed. These models provide a great foundation for further work.

Comprehensive models are still needed for the Lower Platte and Missouri River Tributaries Basins (Figure 5). Models are helpful to provide accurate and detailed information, but they are not always necessary. While assessments of all of the state’s basins will be completed, it is still uncertain if models will be completed in all of the basins. The data used to build these models, and information gained from the completed models will be available on INSIGHT.

With the help of the NRDs, DNR is also in the process of updating and standardizing land use records for the entire state. When this effort is completed, the land use data will be used to better quantify water use. This information will also be incorporated into INSIGHT.

DNR has various divisions that regulate different aspects of water use in the state. Each of these

divisions is currently inventorying their data and developing plans for better organization into the future. These efforts are the first step in integrating this data into the standard format that will be available through INSIGHT.

Outside Collaboration

DNR has significant expertise in hydrologic science and water management. It will work with the NRDs, surface water districts and other water managers throughout the state to develop the scientific input for INSIGHT, including most of the modeling and data collection. However, DNR is contracting for some assistance with the groundwater modeling to develop tools in a more timely fashion. DNR is also seeking contractor assistance in developing the network to store information and the web interface that will be the public face of INSIGHT. However, DNR will maintain and update the databases into the future.

The consultant developing the network and web interface will provide recommendations and more detail on how the site will function and look. Throughout the development of INSIGHT, DNR plans to keep the public apprised of the progress.



This edition of *Water Matters* will be referenced and discussed in the October 2011 DNR newsletter.

Please contact the Nebraska Department of Natural Resources with questions or concerns about this publication at (402) 471-2363.



Visit the Integrated Water Management Division’s website at <http://www.dnr.ne.gov/iwm> for up-to-date information.

Water Matters is available at this website.