Appendix II: Special Issue – Water and Food in Kansas

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Feeding Kansas illustrates how the production, processing, distribution, and consumption of food is a systems issue. Water is a fundamental part of the biological systems that make food production possible. Limited water supply and poor water quality issues are critical to address, in order to strengthen and sustain Kansas's food system.

This special report looks at water-related issues concerning Kansas agriculture as it strives to meet global food needs, including those here at home.

WATER AND THE FOOD SUPPLY

Food comes from water. All plants, including those central to our food supply, are nourished by water. Livestock, too, feed on these plants and their products and depend on regular access to water to survive.

No water, no food.

Food production is water intensive. Take corn, for example. The United States is the number one consumer of corn per capita in the world (USDA-ERS, 2012). In the U.S., corn is an ingredient in a wide range of food products and is heavily relied on for livestock feed. The average U.S. citizen consumes over four pounds of corn per day, or 1,540 pounds of corn per year. Estimating 58 gallons of water to produce a pound of corn grain, it takes approximately 89,320 gallons of water per year to supply just one American with corn (Rogers D. H., 2014). (That number does not account for the amount of water it takes to manufacture the needed tractors, planters, fuel, fertilizer, et cetera.)

Table 1. Water requirement for the production of various food items. (Adapted from Source: http://www.waterfootprint.org/Reports/Hoekstra-2008-WaterfootprintFood.pdf).

Food Item	Gallons per unit	Unit
Lettuce	16	lbs.
Tomato	22	lbs.
Cabbage	24	lbs.
Cucumber or pumpkin	29	lbs.
Potato	30	lbs.
Orange	55	lbs.
Apple or pear	84	lbs.
Banana	103	lbs.
Corn	108	lbs.
Peach or nectarine	144	lbs.
Bread (from wheat)	156	lbs.
Sugar (from sugar cane)	180	lbs.
Mango	192	lbs.
Chocolate	288	lbs.
Dates	359	lbs.
Groundnuts (in shell)	371	lbs.
Rice	407	lbs.
Chicken	467	lbs.
Olives	527	lbs.
Pork	575	lbs.
Cheese	599	lbs.
Beef	1857	lbs.

(Rogers, Anguilar, Kisekka, Barnes, & Lamm, 2015)

Some foods are more water-intensive than others. The amount of water needed to produce food varies based on food type, variety or breed, local conditions, and agricultural practices employed. Due to these variations, quantifying how much water it takes to produce a given food is challenging and estimates can vary widely. Experts consider figures that look at water per unit of yield, rather than water per acre, to be most reliable – such as those seen in the graphic to the right (Rogers D.H., 2014).

STATUS OF WATER USED FOR FOOD AND AGRICULTURE IN KANSAS

In Kansas, water is an integral and increasingly vulnerable resource for producing food through agriculture. Both water quality and water quantity issues put our farm and food system at risk.

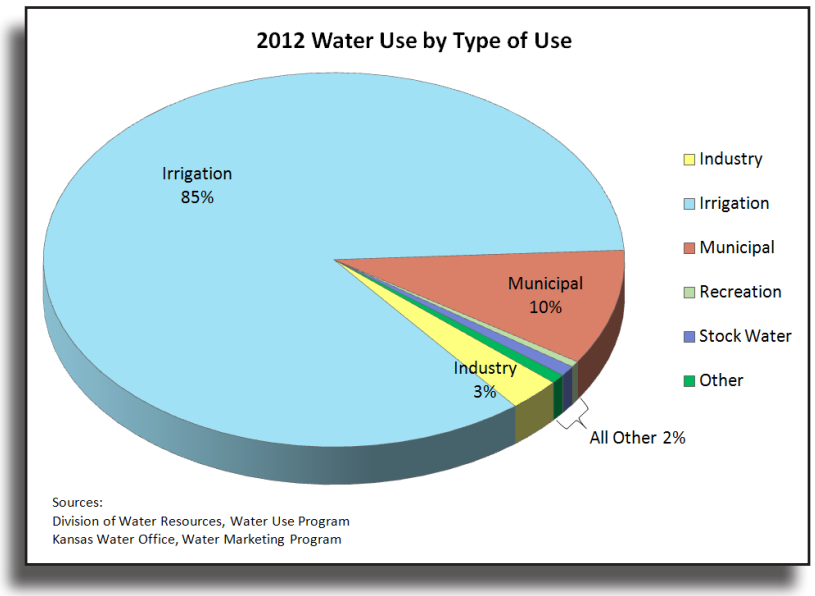
WATER QUALITY STATUS

In terms of water quality, two of the greatest challenges affecting and affected by Kansas agriculture include:

- **Contamination** – Kansas waters are increasingly vulnerable to chemical runoff and other forms of contamination, where wildlife habitat, forests, and grasslands are removed. This is common in operations seeking to extend crop production from fencerow-to-fencerow or from roadside ditch to roadside ditch (EWG, 2012).
- **Sedimentation** – Kansas reservoirs are silting in due to inadequate support for upstream land management (USGS, 2014). This causes both water quality and water quantity issues for the two-thirds of Kansas citizens who rely on reservoir water for flood protection, municipal, irrigation, recreational, industrial, and other uses. During times of drought, five of seven Kansas reservoir basins will not be able to meet demand (KWO, 2014).

WATER QUANTITY STATUS

Water scarcity is a rising concern for agriculture in Kansas, where water is being used at "unsustainable" rates according to researchers from within and outside of the state (Steward, et. al., 2013). Agriculture accounts for the majority of Kansas water use. This water use predominately supports the production of certain irrigated grain crops and livestock for export markets. In 2012, irrigation alone accounted for 85 percent of statewide water use, as depicted in the pie chart from the Kansas Water Office pictured to the right. Nearly 2.9 million acres, 14 percent of Kansas's harvested cropland acres, were irrigated in 2012 (USDA, 2012).



The High Plains Aquifer – which stretches across most of western and south-central Kansas – feeds the majority of Kansas's irrigated cropland and is currently being pumped far faster than its natural recharge rate. In 1960, only 3 percent of the aquifer had been used. By 2010, 30 percent was gone. If current irrigation trends continue, 69 percent of the groundwater stored in Kansas's High Plains Aquifer will be depleted within the next 50 years. **To bring groundwater depletions in line with rainwater recharge, Kansas farmers would need to cut their groundwater pumping by 80 percent immediately, according to researchers at K-State University (Steward, et al., 2013).**

Farms and communities across Kansas are already feeling the effects of water scarcity. In 2013 in west-central Kansas, up to a fifth of the irrigated farmland along a 100-mile swath of the aquifer was reported as going dry; in other areas, farmers reported insufficient water to supply peak summer needs (Wines, 2013). In some locations strapped for water supply during drought, restrictions are placed on gardening, including food gardens, and other home use without necessarily placing similar restrictions on use by industry and production agriculture (Medicine Lodge City Council, 2013). Ranchers with dried-up ponds have had to sell portions or entire herds of cattle before they were market-size, losing income due to limited access to other water sources. Others, unable to irrigate, have left crops to dry up in the fields. This happens even in places not on the High Plains Aquifer, where well water is not available and city or rural water costs are prohibitive (Adamson, 2003).

Increased water availability is linked to increased yields in the production of Kansas's top commodity crops (Steward, et al., 2013). In 2012, an average acre of irrigated land produced more than three times as many bushels of grain corn and two-and-a-half times more soybeans than did dry land (USDA, 2012). Farmers of these crops are put in a tough position when given the choice to either tap into the depleting aquifer or accept decreased yields in times of extreme heat or drought.

All of the above water-related issues are further exacerbated by increasingly uncertain weather patterns that impact crop yields and intensify food security issues such as food supply, distribution, and price (The White House, 2014). Adaptation is needed.

STATEWIDE ATTENTION TO THESE ISSUES

Water resource issues are of increasing importance to Kansas and its agricultural sector.

In October 2013, the Governor charged his administration to develop a "50-Year Vision and Plan for Water in Kansas" by November 2014 (KWO, 2014). The effort included far-reaching public engagement across Kansas, to gather input. The authors of the statewide water vision are tasked with the challenge of balancing the needs of Kansas communities and families with those of the state's economy and leading industries.

Nine natural resource and environmental groups, including the Kansas Rural Center, publicly responded to an early draft of the statewide water vision with concerns that it should not reflect the same "development at all costs" mentality that has put Kansas in its current water predicament. The group emphasized the importance of implementing policy and funding supports aimed at reducing Kansas water consumption to truly sustainable levels (Fund, 2014).

In its official comments on the draft water vision, the Kansas Rural Center wrote that **"to achieve sustainability and protect the water resource, some parts of the Kansas economy will have to change radically, meaning a decline or shift in some activities, while other parts develop to match the water and other resources available."**

WHAT CAN BE DONE?

"If we're able to save as much water as possible now,
the more we save, the more corn we'll be able to grow into the future."
- David Steward, Professor of Engineering at Kansas State University

Water scarcity and water quality issues can put the short-term economic gains of a few at odds with the long-term need to secure adequate water resources for future generations.

Water issues may seem difficult to address. Water is fluid, ever moving. It is hard to grasp with our hands, so how can we keep it from running out?

The truth is,

nothing short of reducing water use will make much difference.

FOR CONSUMERS AND NUTRITION EDUCATORS

Shifting eating habits towards a healthier diet would have a significant influence on conserving water resources. About 90 percent of an individual's personal water footprint is through food. If the 92 percent of Kansans who currently consume nutritionally imbalanced diets were to change their eating patterns to adhere to the "Choose My Plate" dietary guidelines recommended by the United States Department of Agriculture (USDA), it could decrease their personal water footprints by 20% to 35% (Marrin, 2014). This would require a significant increase in consumption of plant-based foods, such as fruits, vegetables, legumes, and whole grains.

Curbing food waste could also help food and farm water footprints decrease. In the United States, about 30 percent of food, equating to about 11 trillion gallons of irrigation water, is thrown away or wasted every year (Lundqvist, de Fraiture, & Molden, 2008).

FOR FARMERS AND POLICYMAKERS

Increased agricultural water use efficiency and advancements in technology can help, but they are not enough. Even those irrigators practicing what's been termed "water smart farming" techniques remain vulnerable to water shortages. **Research supports that the following under-utilized agricultural practices should also be advanced to help protect both water supply and quality:**

- **Integration of cover crops,**
- **Implementation of complex crop rotations,**
- **Conversion of cropland to diversified grassland,**
- **Emphasis on producing more of the foods known to have a smaller water footprint, and less of those foods that tax our diminishing water resource base.**

Policies, programs, research, and funding should increasingly aim to advance these and strategies like these across all types of agriculture (Tirado & Cotter, 2010; National Wildlife Federation, 2012). **Enforcing policies and funding efforts that help Kansas's biggest users, including irrigators, limit water use is critical for preserving Kansas waters for use by future generations.**

Each of the strategies above, for both consumers and producers, **embrace diversity as a key strategy** for protecting and increasing water availability and water quality in Kansas over the short and long term.