

Lower Arkansas River Basin High Priority Issue

The Role of Reuse in Water Conservation

January 2009

Page 1

Issue

The State of Kansas should identify opportunities to better utilize reclaimed water as a valuable water resource.

Description

Many states have been remarkably successful in moving toward water reuse as a means for managing domestic wastewater, conserving water and managing water resources. Several states including Texas (10-16%), Arizona (20%) and California (50%) project that a significant portion of the future water supplies will come from wastewater reuse.⁽³⁾

Reclaimed water may play a significant role in water supply in Kansas. The State of Kansas should identify strategies for implementation of an institutional and regulatory framework to better utilize reclaimed water as a valuable water resource that should be used efficiently and effectively.

Water reuse should be considered an important component of both wastewater management and water resource management in the [Lower Arkansas basin](#). Reuse offers an environmentally sound means for managing wastewater that dramatically reduces environmental impacts associated with discharge of wastewater effluent to surface waters. In addition, use of reclaimed water provides an alternative water supply for many activities that do not require potable quality water, such as irrigation, cooling water reuse, and toilet flushing, which serves to conserve available supplies of potable quality water. Finally, some types of reuse offer the ability to recharge and augment available water supplies with high quality reclaimed water.

Water Use in the Basin

In 2006, over 700,000 acre feet of water was reported used in the Lower Arkansas basin. Irrigation accounted for nearly 75 percent of [all reported water pumped](#) or diverted. Municipal use accounted for 15 percent of water used in the basin, industry for five percent and recreation, stockwater, and other uses combined equal about 5 percent⁽⁷⁾. According to projections conducted using Kansas Division of Budget [population](#) data, the basin population is projected to grow more than 38% by the year 2040. Projected future water supplies in the basin may not be adequate to meet the projected demands. Water reuse may provide an alternative supply while conserving current and future supplies to better serve the projected demands.



Center pivot sprinkler. Photo courtesy KGS.

Current Regulatory Authority

The Kansas Department of Health and Environment (KDHE), Bureau of Water administers programs related to public water supplies, wastewater treatment systems, the treatment and disposal of sewage and nonpoint sources of pollution. Programs are designed to provide safe drinking water, prevent water pollution and assure compliance with state and federal laws and regulations such as the federal Clean Water Act and Safe Drinking Water Act.

State Water Quality Standards include provisions for alternative disposal of treated wastewater and residue material resulting from the waste treatment process.⁽⁸⁾ KDHE's minimum standards for the design of water pollution control facilities include guidelines for agricultural application of wastewater and sludge. Reuse of treated wastewater may contribute to water conservation within the basin.

In the 2008 Kansas Legislature, a bill was introduced that would authorize the Biological Survey at the University of Kansas to conduct a survey that examines the potential to treat non-potable waters for productive reuse.⁽⁵⁾ The Kansas Water Authority, the Kansas Water Office, the Kansas Corporation Commission and the Kansas Geological Survey would collaborate with the Biological Survey to produce a report of the survey findings. The report would also identify potential amounts of water that can be productively treated, cost-estimates for the treatment, potential locations of these treatable waters; identify water discharged from municipal and industrial processes and the potential for productive reuse of such waters; and any policy recommendations to the Governor and the Legislature. The bill was introduced

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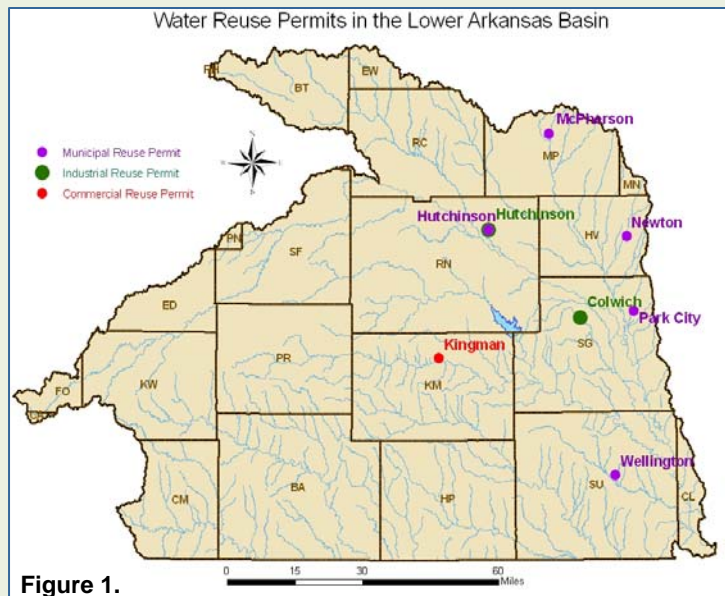
and referred to the Committee on Energy and Utilities, but received no further action in 2008.

Examples of Reuse in Kansas

In Kansas, there are more than 140 communities and facilities that are authorized to reuse treated wastewater. The reuse of wastewater for applications like irrigating turf on golf courses and parks allows these communities to reserve potable water for residential use.

The City of Colby treats more than 2 million gallons of wastewater annually. Through their mechanical treatment process, the city reuses some of the water for irrigation of crops that are not for human consumption. The City of Hays also reuses a portion of its wastewater to irrigate golf courses, parks and ball fields.

In the Lower Arkansas basin, a total of 11 communities and commercial facilities are authorized to reuse treated wastewater (Figure 1). One commercial facility, located in Kingman, is authorized to utilize the wastewater effluent for the irrigation of grass and/or agricultural areas. As a condition of the permit, this facility must control tailwater to prevent runoff to surface waters, must only draw water from the final cell in the treatment process and must not irrigate crops for direct human consumption. Two industrial facilities, located in Colwich and Hutchinson, are authorized to use wastewater effluent for irrigation. Eight municipalities, including Hutchinson (four permits), Newton, Park City, Wellington and Winfield, are authorized to use the wastewater effluent for the irrigation of golf courses and other public use areas such as parks, ball fields and cemeteries.⁽¹⁾



Opportunities for Reuse

Renewable fuel production is a growing industry in the Lower Arkansas basin. Ethanol production, like many industrial and agricultural practices, involves a consumptive use of water. A 50-million gallon per year (MGY) ethanol plant uses about 200 MGY of water (or about 550,000 gallons per day), primarily from evaporation during cooling and wastewater discharge. As new facilities are sited and current facilities are improved, ethanol production in the basin presents an opportunity for industrial water reuse.

Irrigation accounts for nearly 75% of all reported water pumped or diverted in the basin.⁽⁷⁾ Reclaiming water for irrigation of agricultural land could have a significant impact on water use in this region. As in Colby, most current examples of reuse for irrigation in Kansas are for the application to crops that are not for human consumption. Some other states such as Florida promote water reuse for edible crop irrigation. In 2001, a total of 34 million gallons per day was reused to irrigate edible crops such as citrus, tomatoes, cabbage, peppers and beans in Florida.



Recharge Basin.

Artificially recharging the Equus Beds aquifer, which underlies the City of Wichita well field, is one water reuse alternative being employed to meet future demands for water for the city and other users in the area. An additional benefit of artificial recharge includes creating a hydraulic high in the ground water, thus blocking migration of saltwater plumes from the Burrton oil field to the northwest into the aquifer region of the city well field. Diverting water from the Little Arkansas River through streambank storage (diversion) wells when flow in the river exceeds base flow and then artificially recharging water into the Equus Beds aquifer through injection wells and recharge

Lower Arkansas River Basin High Priority Issue

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basins is an example of a successful water reuse strategy. The water is treated to drinking water standards prior to recharge at the Segdwick site. In 2007, over 350 million gallons were recharged into the aquifer through this project.

Parks, golf courses and other recreational facilities also hold an opportunity to utilize wastewater reuse. More than 24 communities in the basin have at least one golf course. Maintaining green turf for golf courses requires significant quantities of water. Average water use for those facilities with an irrigation water right for golf course turf in 2006 was about 47 acre feet per year. Some facilities, typically those larger than 150 acres, reported more than 200 acre feet of water use in 2006.⁽⁷⁾



South central Kansas is an area where communities rely on ground water from the High Plains, Arkansas River alluvial and Permian bedrock aquifers for domestic, municipal, agricultural and industrial uses. However, substantial areas of these aquifers contain brackish ground water which appreciably limits the locations and quantities of freshwater resources that can be withdrawn. A characterization of the quantities of high quality ground water available, and the suitability for various treatment schemes for brackish water, is needed. This may a region of future water shortages.

Barriers to Reuse

Protection of human health is the primary concern when developing and implementing a wastewater reuse program. KDHE identifies several standard management practices for reuse of treated domestic wastewater for

instances when the wastewater will be applied to public areas such as golf courses or parks. Typical protective practices include an increased degree of disinfection, only applying the treated wastewater when public access is restricted and posting signs warning against swimming in or drinking ponded wastewater. Irrigation of crops produced for direct human consumption is not permitted by KDHE. Monitoring of the treated wastewater is required using Environmental Protection Agency (EPA) approved methods and KDHE certified laboratories if applicable.

Community involvement and public education is an important component in developing large scale wastewater reuse projects in the basin. In some states, public perception of utilizing reclaimed water to augment potable water sources, even in an indirect manner, has prevented some projects from implementation.

A portion of water diverted for all beneficial uses is considered "non-consumptive" when it is returned to the natural system through streamflow or ground water recharge. Consideration of the potential impacts of water reuse to downstream users is needed to ensure local water conservation activities do not negatively impact larger regional conditions. Under the rules and regulations of the Kansas Water Appropriation Act, the extent of consumptive use can not increase after a water right has been perfected.⁽⁹⁾

Water reuse and the associated change in water returned to the natural system may impact instream habitat. Numerous threatened and endangered species including six fish, occur in the Lower Arkansas basin. Consideration of the potential impacts to instream habitat and species viability is needed to ensure that water conservation measures do not negatively impact instream use.

Salt accumulation may be a factor when evaluating the potential for water reuse, especially on golf courses and in agricultural irrigation. Water softening and other activities can add substantial amounts of sodium chloride to the wastewater. Typical wastewater treatment processes in use today often do not remove or manage inorganic salts. Facilities choosing to irrigate with treated wastewater may need to alter plant species selections or use other methods to address total dissolved solids, sodium and salinity in effluent.

The use and disposal of pharmaceuticals and personal care products entering sewer systems and surface water is an emerging concern for wastewater treatment. Wastewater treatment plants are designed to remove

Lower Arkansas River Basin High Priority Issue

The Role of Reuse in Water Conservation

January 2009

Page 4

conventional pollutants such as suspended solids and biodegradable compounds, but they are not designed to remove low concentrations of synthetic pollutants, such as pharmaceuticals.⁽²⁾ Depending on the purpose and application of treated wastewater, the affect and mitigation of these contaminants needs to be considered.

Recommended Actions

1. Provide public education on water reuse in irrigation, industry, municipal and domestic uses, and encourage communities to build in water reuse as part of their plans to meet future demand.
2. Where appropriate, establish the promotion and encouragement of water conservation and reuse as formal basin specific objectives for the Lower Arkansas basin.
3. Facilitate storage of seasonal reclaimed water from streamflow (including aquifer storage and recovery).
4. Facilitate interagency coordination between Kansas Department of Agriculture-Division of Water Resources and Kansas Department of Wildlife and Parks to ensure water reuse activities and permits remain in compliance with Kansas Water Appropriation rules and regulations and stream habitat issues are discussed.
5. KDHE evaluate the potential impact of water reuse on downstream users and stream habitat.
6. Encourage use of reclaimed water in lieu of other water sources in the agricultural irrigation, landscape irrigation, industrial/commercial/institutional and indoor water use sectors.
7. Link reuse to regional water supply planning including integrated water resource planning.

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