REDUCING OUR VULNERABILITY TO EXTREME EVENTS

Issue Statement

Floods, droughts, winter storms and other extreme weather events affect Kansas on a regular basis. Severe flooding occurred in Kansas in 1935, 1951, 1965, 1973, 1976, 1981, 1983, 2007, and again in 2011, when the Missouri River flooded in northeastern Kansas, while drought gripped the remainder of the state. Droughts have repeatedly occurred in Kansas, with most aware of the "dirty thirties" and the 1950s drought. Proxy evidence indicates droughts in Kansas of even greater severity and duration over the past thousand years. Climatologists have warned that Kansas is facing a warming trend in our future, with more frequent droughts and floods likely.

The goal is to reduce our vulnerability to extreme events. This requires plans and actions to create resiliency that will assure clean water delivery to citizens and industry, and reduce economic and environmental impacts of extreme events to communities, farming, ranching, the energy sector, transportation, and recreation.

Importance of the Issue

While weather extremes are not new to Kansas, planning is needed to incorporate resiliency to potential climate extremes. Intense precipitation events pose a risk of flooding and increase the risk of soil erosion, leading to higher sediment, nutrient and other pollution loads in streams. Water related infrastructure can also be at risk, threatening the delivery of safe water for drinking and other uses. On the other end of water availability, drought, delivery of water is also the key need. Water can be in short supply requiring careful management, conservation and possibly additional supplies.

Flooding usually occurs relatively quickly when precipitation falls faster than it can be absorbed or above the ability of a channel to contain it. Preparation in the form of plans to warn of flooding, protect infrastructure and keeping sediment and nutrients entering water bodies at a minimum can decrease adverse effects and duration of any impacts.

Drought on the other hand often comes on slowly, building to an inability to supply sufficient water as storage, above or below ground is not replenished. Again planning to identify key needs and indicators can reduce extreme impacts of a drought.

Extreme events impact agricultural production associated industries as well as property. For example, the USGS estimates the United States averages $8-9 billion every year in losses due to drought. The Kansas Department of Agriculture estimates the cost of the 2012 drought at more than $3 billion in crop losses - the loss of production and the price farmers would have received. The 2011 drought cost Kansas production agriculture roughly $1.8 billion, the department estimated last year, along with about $366 million in herd liquidation that year as cattle flooded livestock auction houses by midsummer. More than $1.3 billion in crop insurance indemnity payments for failed commodities were paid in 2012, according to the U.S. Department of Agriculture's Risk Management Agency. Flood damages in 2011 along the Missouri River over $1 billion in Nebraska, Iowa, Missouri and Kansas. This included repairs to levees, roads, other infrastructure, and cropland. This does not include damages to homes and personal property, while major reservoirs are credited with preventing billions of dollars of flood damage upstream.

Three planning considerations are risk reduction, risk management and recovery and involve clearly defined options to manage, prepare for, respond to and recover from extreme events. Water-management involves three major areas: (1) floodplain management to decrease loss during floods, (2) flood-forecast and warning systems, and (3) planning adequate availability and efficient use of water resources during droughts.

Needs (gaps) to reach goal

Review current infrastructure adequacy for flood protection from even larger rainfall events, and evaluate reservoir storage space to provide sufficient water yield during longer, more intense droughts. In order to prepare for such events is it important to identify and characterize potential impacts of extreme weather-related events on source water quality, treatment and distribution processes, and finished water quality.

The National Climatic Assessment Report, 2013, projects that current temperatures will increase by two to four degrees Fahrenheit by 2100. Even small increases in average temperatures raise the risk of heat waves, wildfires, and droughts, as well as higher surface water evaporation and more turbulent atmospheric conditions leading to severe weather. According to projections, the total amount of precipitation may stay about the same, but occur in less frequent, more intense storms.

Flood Management

Floodplain maps provide guidance for local land use planning however, other considerations often take precedence when development occurs in floodplains. Flood management involves both structural and non-structural measures to utilize floodplains and wetlands to minimize loss of life and damage to property from flooding and benefit the ecosystems from periodic flooding. Flood resiliency requires well-developed procedures for communication between forecasting agencies and emergency services, downstream communities and transportation users with real-time information on developing flood events. Outreach to Public Water Suppliers to provide tools to evaluate how they would address flooding of any portion of their water supply infrastructure is an important element of risk reduction.

Drought Management

Drought management is needed by all sectors that use water. Additional storage of water in reservoirs or in aquifers gives Kansans greater ability to manage changes in the precipitation timing, duration and frequency, with longer dry spells in-between. This can be accomplished by the building or purchase of additional storage or the recovery of existing storage already lost to sedimentation.

To mitigate drought, public water suppliers need to continue to reduce water loss in their systems, and have an updated, approved drought plan. Currently emergency plans are required but drought plans are not. For communities using a common source of supply, drought plans should be consistent in use restrictions to minimize political issues of fairness and equitability. Alternate supplies need to be developed for Public Water Supply (PWS) systems vulnerable to drought.

Adaptation to changing conditions and minimizing harm during severe droughts are also necessary in agriculture. No or strip till, drought tolerant crops, and decision support tools such as irrigation scheduling and crop water allocator can help manage risk. Many federal and state lakes provide an alternate water supply for livestock during droughts.

Approach to address needs (gaps)

The resiliency of infrastructure to floods and droughts needs to be evaluated, and a long range plan developed to restore or build additional storage. The structural integrity of dams to manage increased flood flows needs evaluated, along with development of new inundation maps. New dams/reservoirs and other infrastructure should be designed to be robust with ability to manage changing climatic conditions. A robust reservoir is one in which the amount of water that it can reliably supply will not significantly change even when extreme events are at their worst.

State, federal and local government can develop plans for resiliency under extreme events: improve coordination; enhance monitoring and early warning capabilities; develop water shortage impact assessments; and have preparedness, response, and recovery programs. Other efforts include municipalities and industry maintaining emergency and drought plans, active education opportunities for water system operators and decision makers, and building awareness of other tools for emergencies.

Support planning and warning tool development for flood and drought (National Integrated Drought Information System (NIDIS)).

References

https://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf

http://greatplainsclimate.org/p.aspx?tabid=17

http://www.planning.org/policy/guides/pdf/climatechange.pdf

http://ks.water.usgs.gov/pubs/reports/wsp.2375.ks.html

http://ks.water.usgs.gov/pages/191-Historic-Floods-of-Kansas.

http://ks.water.usgs.gov/pubs/reports/wsp.2375.ks.html

http://ks.water.usgs.gov/120-KS-Drought

http://www.ncdc.noaa.gov/paleo/drought/drght_history.html

http://ridenbaugh.com/waterrights/?p=2348

http://www.hutchnews.com/Todaystop/Sun--Bick-wheat-improvement-

http://www.omaha.com/article/20120228/NEWS01/702289888

Layzell, Anthony, 2012, A thousand years of drought and climatic variability in Kansas: Implications for water resource management. KGS OFR 2012-18. http://www.kgs.ku.edu/Hydro/Publications/2012/OFR12_18/