

## Sustainability and Regional Water Supply Planning

About one-third (30%) of states as of 2005 have considered sustainability in state water plans or planning activities and it is predicted that “The goal of achieving sustainable water resource systems will become more widely incorporated in water resources planning processes.” (page 18).<sup>1</sup>

During the past year, the Regional Water Supply Planning Group (RWSPG) has been hearing and thinking about the concept of “sustainability” and its potential application to water resources planning and management. Whether this concept is useful either as a planning principle or a more general framework for regional planning is presently undecided. During the next eighteen months, the RWSPG will nonetheless demonstrate where its commitment to sustainability lies along a theoretical spectrum that might be imagined to range from “no commitment” to “full commitment”. Along the way, the RWSPG will have to develop some understanding of the concept and debate the appropriateness of applying it to its planning endeavor.

At the November 2007 RWSPG meeting, Dr. Derek Winstanley asked, “Do you wish to use sustainability as a framework for making management recommendations? If yes, you probably need to clearly define sustainability in an operational mode, otherwise perhaps (it is) not different from reasonable use. If not sustainability, will you adopt another framework?”<sup>2</sup> In order to advance the RWSPG’s understanding of the concept, this paper attempts to provide “grist for the mill” of healthy discussion.

While the word sustainability can mean different things to different people, a couple of definitions in a water resources context are offered below:

1. Sustainable water resource systems are those designed and managed to fully contribute to the objectives of society, now and in the future, while maintaining their ecological, environmental, and hydrological integrity.<sup>3</sup>
2. Ground-water sustainability as development and use of ground water in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic, or social consequences.<sup>4</sup>

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<sup>1</sup> W. Viessman, Jr. and T.D. Feather (editors). 2006. State Water Resources Planning in the United States. American Society of Civil Engineers.

<sup>2</sup> Derek Winstanley presentation titled, “Water Supply Planning and Management: Sustainability” and available at [http://www.sws.uiuc.edu/iswsdocs/wsp/ppt/CMAP\\_11\\_27\\_07.pdf](http://www.sws.uiuc.edu/iswsdocs/wsp/ppt/CMAP_11_27_07.pdf)

<sup>3</sup> American Society of Civil Engineers Task Committee for Sustainability Criteria. 1998. Sustainability criteria for water resource systems. Division of Water Resource Planning and Management, ASCE *as cited in* D.P. Loucks, E.Z. Stakhiv, and L.R. Martin. 2000. Editorial: Sustainable Water Resources Management. J. of Water Resources Planning and Management, March/April 2000.

<sup>4</sup> W.M Alley, T.E. Reilly, and O.L. Franke. 1999. Sustainability of Ground-Water Resources. U.S. Geological Survey Circular 1186. Available at <http://pubs.usgs.gov/circ/circ1186/pdf/circ1186.pdf>

These definitions imply the need for intragenerational equity (i.e. make sure everyone has what s/he needs today) as well as intergenerational equity (i.e. save some for later so that our great grandchildren and their children can enjoy the same level of benefits that water resources provide today). These definitions also encourage a “systems thinking” approach to planning and management in order to achieve sustainability. (For more on Systems Thinking, one can begin here: [http://en.wikipedia.org/wiki/Systems\\_thinking](http://en.wikipedia.org/wiki/Systems_thinking) )

A subset of Illinois State Water Survey (ISWS) and Illinois State Geological Survey study results is presented below. These results were chosen because of an apparent relationship to sustainability and are not meant to capture fully all of the conclusions drawn by the State Surveys. Members of the RWSPG are encouraged to raise other issues that could potentially impact plan recommendations.

- 1) At the October 2007 RWSPG meeting in Geneva, the ISWS indicated that regional use of the deep-bedrock aquifer (84 mgd as of 2002) is now thought to exceed the recently revised volume of sustainable yield – 80 mgd.<sup>5</sup> It appears, therefore, that current and projected regional scale use of the deep bedrock aquifer is not consistent with the USGS definition of groundwater sustainability. Is this a problem and, if so, what should the regional plan recommend to address this aspect of regional water use? Should this information, for example, lead to a recommended moratorium on additional deep wells?
- 2) Also regarding the deep bedrock aquifers and referencing the same presentation as above, the Ancell Unit head in eastern Kane County appears to be in contact with the arsenic-bearing minerals that are depicted as an interface between the Ancell Unit and Galena-Platteville Unit above it. As the Ancell head is projected to fall with continuation of 2002 pumping rates, there would appear to be a potential risk for increased arsenic concentrations in public drinking water sourced from groundwater. This may serve to be an example of “acceptable impacts and costs from withdrawals” discussed by Dr. Winstanley.
- 3) A September 2007 presentation by the ISWS<sup>6</sup> in St. Charles at the Kane County 2007 Priority Places Workshop, indicates that should demand

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<sup>5</sup> H. Allen Wehrmann presentation titled, “Water for Kane County: Highlights of the Illinois State Water Survey’s Results and Application to the Northeast Illinois Water Supply Planning Process” and available at [http://www.sws.uiuc.edu/iswsdocs/wsp/ppt/Kane\\_Co\\_Water.pdf](http://www.sws.uiuc.edu/iswsdocs/wsp/ppt/Kane_Co_Water.pdf)

<sup>6</sup> George S. Roadcap presentation titled, “Effects of Future Pumping on Shallow Groundwater Circulation” and available at [http://www.sws.uiuc.edu/iswsdocs/wsp/ppt/KC\\_10.pdf](http://www.sws.uiuc.edu/iswsdocs/wsp/ppt/KC_10.pdf)

- forecasts suggest a need for new (Kane County) withdrawals, “many of the prime locations for new large well fields are currently used; there will be impacts to existing users (e.g. Algonquin well no. 8 goes dry) and impacts to low flows in streams (e.g. reduction in baseflow contribution to the Fox)” How should this information help frame the discussion going forward with respect to use of the shallow aquifers? Does this suggest, for example, that a greater emphasis be placed on conservation or wastewater reuse in shallow groundwater dependent communities?
- 4) At the May RWSPG meeting in Deerfield, the ISWS<sup>7</sup> indicated that “new water withdrawals (from the Fox River) should not cause reduction in the flow level below the Q7 / 10.” Since most of the Fox River water withdrawn for public supply is returned as wastewater, does this not constitute the most sustainable use of water in the region? If so, should the plan emphasize greater use of the Fox (and Kankakee) versus new groundwater withdrawals?
  - 5) The region is challenged to imagine Illinois use of Lake Michigan water in terms different from the traditional definition of sustainability. Can it be argued that regional use of the US Supreme Court-determined allotment is sustainable IF continued use is less than the annual diversion limit of 3,200 cfs and/or able to serve increasing numbers of people with Lake water? Currently, both scenarios are occurring. Would increased gains with conservation and efficiency in the Lake Michigan service region, in order to maintain these trends, be tantamount to sustainable use of Lake Michigan water?
  - 6) Currently, the level of Lake Michigan hovers at the record-low level recorded since 1860. Is there a Lake Michigan-level threshold below which Illinois must consider returning water to our Great Lake? Or are Lake levels sufficiently independent of the planning task at hand and thus, largely irrelevant?

These and other questions await RWSPG deliberation and answers. Additional material can be prepared by CMAP staff to help focus discussions as the regional plan begins to take shape.

T.T. Loftus  
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<sup>7</sup> H. Vernon Knapp presentation titled, “Northeastern Illinois Streams: Factors That Affect the Distribution and Availability of Streamflow for Water Supply and Instream Needs” and available at [http://www.sws.uiuc.edu/iswsdocs/wsp/ppt/SW\\_Availability.pdf](http://www.sws.uiuc.edu/iswsdocs/wsp/ppt/SW_Availability.pdf)