UNCERTAINTIES AND CHALLENGES IN STATE AND REGIONAL WATER SUPPLY PLANNING

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CONTENT

- Purpose of water supply planning
- Uncertain future and data and analytical limitations
  - drought and climate change
  - water withdrawals
  - geology
  - water demand
  - impacts of withdrawals
  - economics
  - social values
- Conclusions
THE GOAL
OF
WATER SUPPLY PLANNING

TO ENSURE ADEQUATE SUPPLIES OF
CLEAN WATER FOR ALL USERS
AT REASONABLE COST
WATER WILL NOT CONTINUE TO FLOW FROM THE FAUCET WITHOUT ADEQUATE PLANNING

Planning for an uncertain future entails risk assessment and risk management
WATER SUPPLY IS EMBEDDED IN ENVIRONMENTAL, ECONOMIC AND SOCIAL ISSUES

Water Supply Planning and Management

HUMANS
- Ethics
- Politics
- Laws & Regulations
- Culture

NATURE
- Biological Species
- Rocks
- Sediment
- Soil
- Atmosphere

Water

Ethics
Politics
Laws & Regulations
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Water
THE WATER CYCLE: CLIMATE, SURFACE WATER and GROUNDWATER ARE INTERCONNECTED
DROUGHT

• Severe multi-year droughts have occurred periodically in the past and will occur again in the future.

• Droughts reduce water availability, increase water use, and create water shortages.

• Droughts must be planned for and managed.
DROUGHT FREQUENCY AND MAGNITUDE IN ILLINOIS
(M. Palecki, ISWS)
LAST 40 YEARS RELATIVELY FREE FROM MAJOR
MULTI-YEAR DROUGHTS (RED)
DROUGHT PLANNING AND MANAGEMENT

- RISK ASSESSMENT & MANAGEMENT
  - 1 in 50 year droughts?
  - 1 in 100 year droughts?
  - worst-case droughts?

- DROUGHT PREPAREDNESS
- DROUGHT RESPONSE
CLIMATE CHANGE

• Warmer – probably
  - higher temperature increases water demand and reduces water availability

• Wetter or drier – don’t know
  - drier conditions, like drought, increase water demand and reduce water availability
RESULTS FROM 120 GLOBAL MODEL RUNS UNDER HIGH, MEDIUM and LOW EMISSIONS SCENARIOS (ASC/AWS). 5th and 95 percentiles shown.
RESULTS FROM 120 GLOBAL MODEL RUNS UNDER HIGH, MEDIUM and LOW EMISSIONS SCENARIOS (ASC/AWS). 5th and 95 percentiles shown.
How much more water can we withdraw from the deep aquifers of NE I Illinois? (GSC/ISWS)

Lake Michigan allocations start?

Walton’s 1964 estimated deep aquifer yield ~ 65 mgd
Simulated Drawdown from IAWC Wellfield
2005 draft (George Roadcap, ISWS)
MAHOMET AQUIFER
Hydrogeology *(ISGS)*
The need for good hydrogeological data to model
WATER DEMAND TO 2050 (mgd):
11 COUNTIES NE ILLINOIS
(data from Ben Dziegielewski, 2008)
WATER DEMAND TO 2050 (mgd):
15 COUNTIES EAST-CENTRAL ILLINOIS
(data from Wittman Hydro Planning Associates, Inc, 2008)
WHAT IMPACTS AND COSTS ARE SOCIALLY ACCEPTABLE?

- Drawdown?
- Impacts on existing wells?
- Reduction in surface-water flows?
- Changes in regional groundwater flow?
- Dewatering an aquifer?
- Water quality?
- Desalinating water?
- Transporting water from the Mississippi?
CONCLUSION:
SOME KEY QUESTIONS

• How much more water can be allocated from the Lake Michigan Diversion?
• How much more water can be withdrawn safely from rivers and aquifers?
• What are sustainable yields?
• How much can the price of water be increased to reduce demand and increase supply?
• How much reduction in water demand can be achieved by water conservation and reuse?
• What magnitude and frequency of drought should we be prepared for?
• What risk of climate change should we be prepared for?
WE DO KNOW THAT …

• WITHOUT ADEQUATE PLANNING THERE WILL BE THREATS TO THE ENVIRONMENT, ECONOMIC DEVELOPMENT AND SOCIAL WELL BEING. COMPETITION AND CONFLICT.

• WE ARE ENGAGED IN 2 PILOT PROJECTS FOR REGIONAL WATER SUPPLY PLANNING AND MANAGEMENT.

• A PERMANENT STATEWIDE PROCESS MUST BE PUT IN PLACE AND FUNDED.
THE END

MORE INFORMATION

http://www.sws.uiuc.edu/wsp