

Water Management and Climate Change: Challenges and Solutions



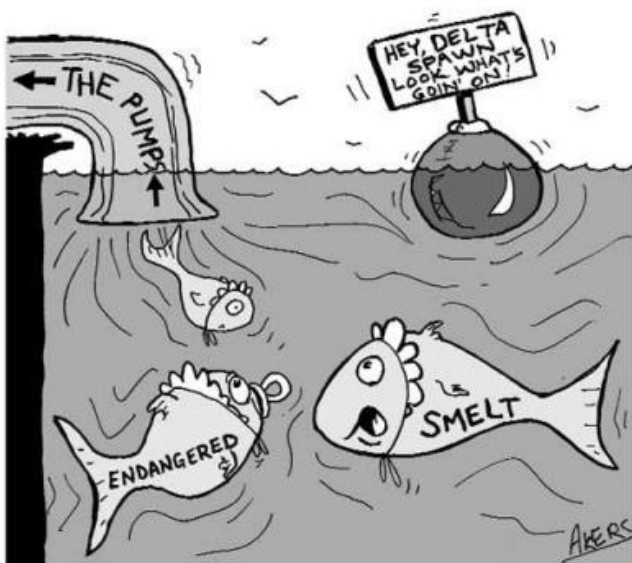
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AMS-AGU-AAAS-ESA-Pew Center

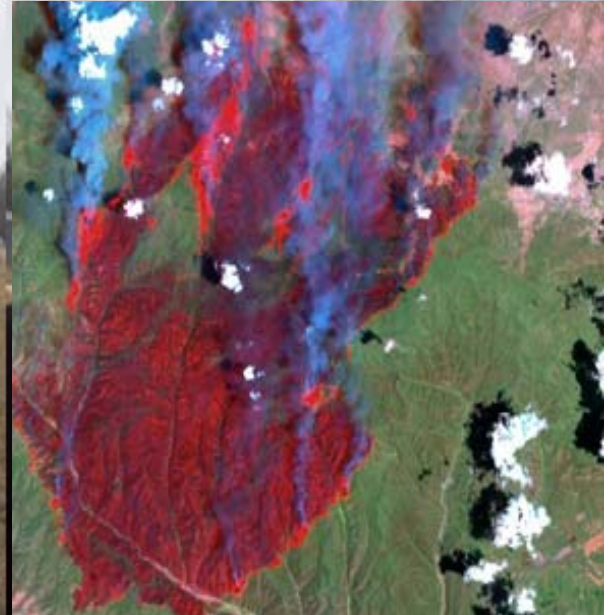
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Washington, DC

Most of the impacts of climate change are felt through changes in the water cycle



"IF ONLY THEY COULD JUST BYPASS US"



Climate change drivers related to water

- Temperature is a hydrologic variable affecting both supply and demand

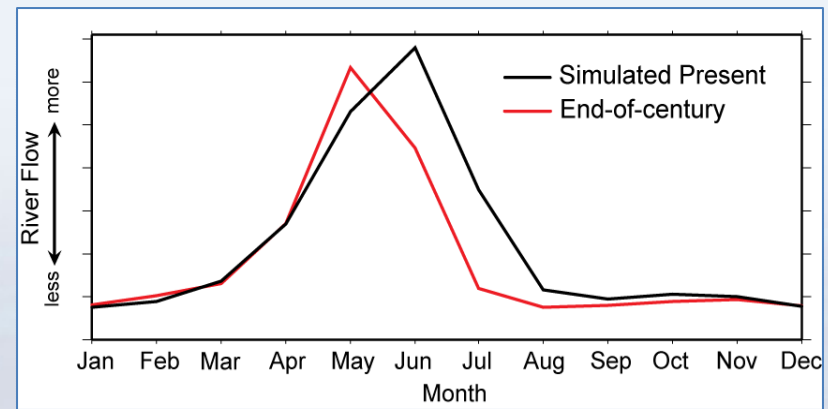


Climate change will affect

- Partitioning of precipitation: surface runoff, groundwater, evapo-transpiration
- Water temperature and quality
- Groundwater-surface water interactions
- Rate of change; thresholds

Impacts of Climate Change on Water Cycle

- Less supply/storage from snow melt
 - Higher % of precipitation as rain vs snow
 - Earlier melt and peak flows
- Loss of reservoir storage
 - Evaporation and sedimentation
 - Dam operating constraints (e.g., flood control)
- More extreme events, both floods and droughts
- Serious implications for aquatic ecosystems



Impacts on Western Water Supplies

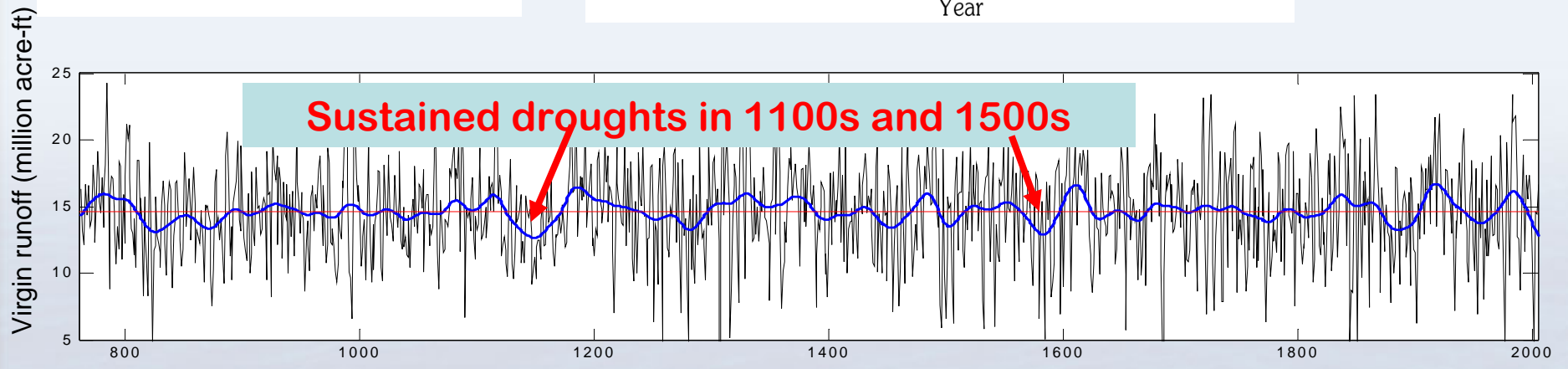
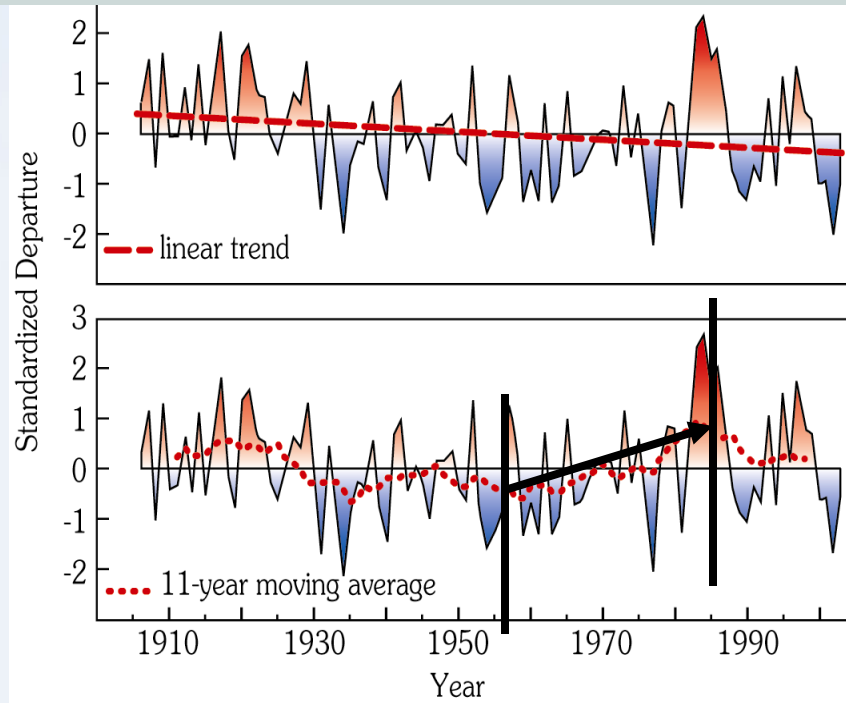
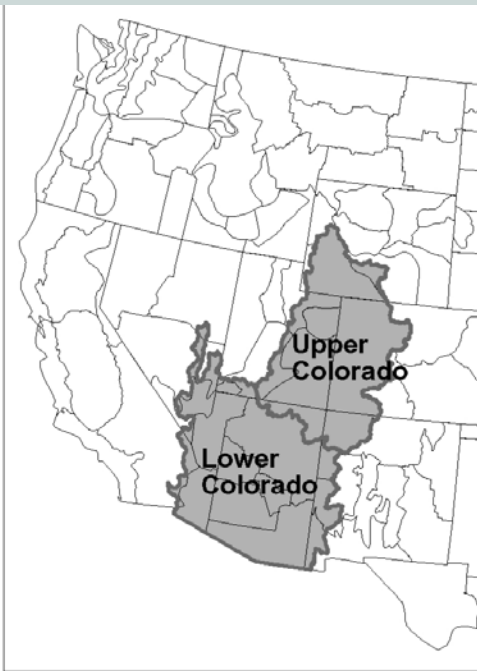


- Projected climate change impacts on flows in the Colorado are significant; multiple studies project a range from 11% to 40% reduction in runoff by 2050
- Increases in municipal demand result in even higher stress on the system

But: How much information do we really need to make better decisions?

“ We may not know the magnitude or the rate of change over time, but we know the direction”

Reframing: Developing a long-term perspective on variability and trends



Data from Meko et al., Geophysical Res.

Reframing

- Managers make decisions with imperfect information all the time – why is climate change different?
- Adaptive management – deliberate learning by doing
- Co-benefits – it is not all about climate change, justify action by addressing other vulnerabilities
- Small institutional and legal changes can make a big difference, eg eliminating conflicting mandates
- Potential for partnerships and economic opportunity
- Climate change as an excuse to do integrated planning, eg NYC – or do things that make sense anyway, eg changes to the National Flood Insurance program; it is a good integrating concept

Reframing: Expand the solution set to include new technologies and practices

Expand portfolio of technology solutions:

- desalination,
- reuse and recharge of municipal wastewater,
- rainwater harvesting,
- improved management of floodflows,
- integration/redundancy of delivery systems for reliability



Reframing: Mainstreaming adaptation into every day decisions

- US Infrastructure is aging and needs replacement. Re-evaluate engineering assumptions re: potential for more extreme events and longer-term droughts

Non-stationarity: the past is no longer an analogue for the future



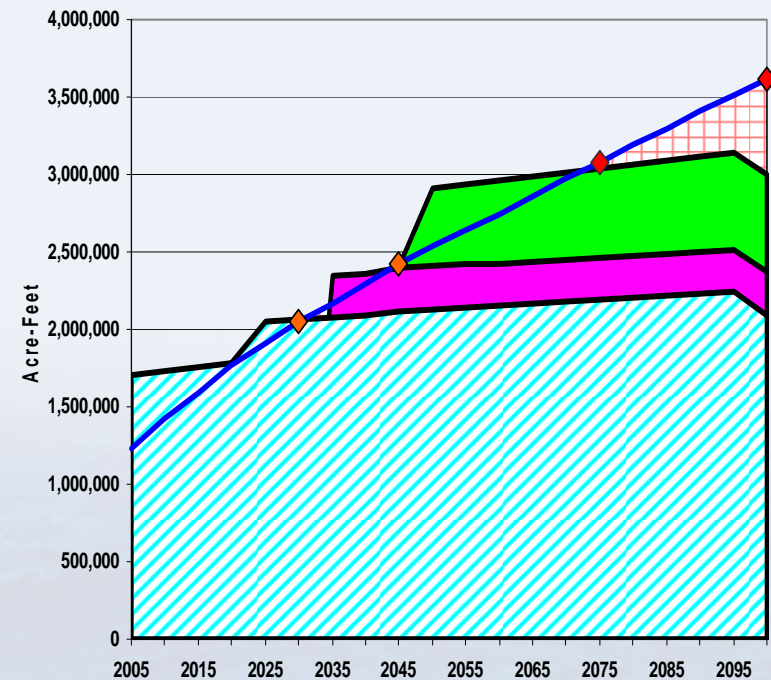
Reframing: The “Watergy” Perspective

- Most water technology solutions are energy-intensive:
 - irrigated agriculture,
 - pumping groundwater,
 - inter-basin transfers,
 - desalination,
 - cloud seeding,
 - dry cooling
- Energy-intensive options will be less attractive in the future.
- Conservation has double benefits: it saves water and it saves energy.



Reframing: Planning Tools

- Expand planning scenarios to bracket a wider range of outcomes (include both supply and demand impacts)
 - Include social and physical factors that create the context within which drought/flood impacts will be felt
 - Connect adaptation and mitigation objectives



Next steps in Adaptation

- Planning a national summit on adaptation, one of several forums for getting input from a broad set of stakeholders on the National Climate Assessment pursuant to the 1990 GCRA.
- Initial steps being taken to assure production of the next National Assessment by 2013.
- Action items include: building and mobilizing science, monitoring and decision support for both adaptation and mitigation activities.