



Concepts and Methods for Assessing Water Sector Responses to Climate Change Events

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Outline

LECTURE 1

1. Watershed Assessment in Concept and Theory
 - Economic valuation and opportunity costs
 - Private and Public Choices
 - Market roles and limitations (pros and cons)
 - Non-market values, externalities, and collective action
2. Modeling and Economic Assessment of Watersheds
 - Goals and objectives in watershed assessment
 - Adaptation costs and benefits of water-use changes
 - Balancing water supply and demand
 - Modeling approaches and platforms
 - (1) System Dynamics Models (simulation)
 - (2) Hydro-Economic Models (optimization)
 - Long-run watershed adaptation assessment and planning
 - Conceptual framework and key economic principles
 - Optimizing water allocations across uses, places and time

LECTURE 2

3. Hydro-Economic Modeling Climate Change Adaptation Case Studies
 - Integrating climate, hydrology and Economics
 - Conceptual framework
 - Scenario design and data development
 - Economic valuation functions
 - Case #1: Colorado River
 - Case #2: Rio Grande
4. Strategies for Developing Climate Change Scenarios and Modeling Data
 - Climate scenarios and data
 - Hydrological data and modeling
 - Economic data
 - water supply (cost) estimation
 - demand (benefit) estimation
 - Collaborate, work together and other final thoughts



Readings

Booker, J. F., Howitt, R. E., Michelsen, A. M., & Young, R. A. (2012). Economics and the modeling of water resources and policies. *Natural Resource Modeling*, 25, 168-218.

Heinz, I., Pulido-Velazquez, M., Lund, J. R., & Andreu, J. (2007). Hydro-economic modeling in river basin management: implications and applications for the European Water Framework Directive. *Water resources management*, 21(7), 1103-1125.

Harou, J. J., Pulido-Velazquez, M., Rosenberg, D. E., Medellin-Azuara, J., Lund, J. R., & Howitt, R. E. (2009). Hydro-economic models: Concepts, design, applications, and future prospects. *Journal of Hydrology*, 375, 627-643.

Hurd, B. 2008. "Coping and adapting to a changing climate: Concepts, issues and challenges," *Annals of Arid Zone*, 47(3&4): 221-231.

Hurd, B. and J. Coonrod. 2012. "Hydrological and economic consequences of climate change in the Upper Rio Grande region," *Climate Research*, 53:103-118. doi: 10.3354/cr01092.

Hurd, B.H. 2012. "Climate Vulnerability and Adaptive Strategies along the Rio Grande/Rio Bravo Border of Mexico and the United States," *J. of Cont. Water Research and Education*. Dec (149:56-63).

Hurd, B.H. 2014. Concepts and Methods for Assessing Economic Impacts from Climate Change on Water Resources, NMSU working paper.