Integrated Financial Strategies to Manage Complex Natural Systems

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Wednesday, October 31, 2018
0001 Hooker (BC/BS Auditorium)
12:20 – 1:10 p.m.

Worldwide, natural systems management is challenged by population growth, economic development and climate change. In multi-purpose water systems, stakeholders can face higher financial risks as a consequence of increased hydrological uncertainty and recurrent extreme events. Since most environmental infrastructures are financed through debt, reducing financial risk is critical to natural systems management. Traditionally, the approach to financial risk management has been a structural one (e.g., supply expansion); however we are adapting to a slower pace of surface water development because it is a costly, sometimes controversial and non-flexible solution. Alternatively non-structural adaptation, such as demand management and reserve funds, are being increasingly used. This typically leads to more efficient and sustainable strategies. However, adaptation strategies are not always applicable in case of very high and rare losses as the ones caused by extreme events. This is the context in which financial instruments, such as index-based insurance contracts, are most efficient. This seminar will outline novel integrated financial strategies to manage risk in complex multi-agents water systems characterized by hydrologic uncertainty, conflict and socio-economic changes. Presented applications will include the potential of financial instruments to act as negotiation tools for competing water users, the bundling of inversely correlated drought and flood risk in a shared river basin, and the evaluation and management of financial risk for a large federal hydropower company.