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Seminar Title: Economic dynamics of reservoir sedimentation management using hydrosuction dredging

Dams have been designed traditionally as nonrenewable resources. Their productive lives are cut short because rivers refilling reservoirs transport sediments that choke off reservoir storage capacity. The large environmental and economic costs of restoring storage capacity by constructing new dam/reservoir projects is prompting a shift in paradigm toward managing existing projects as renewable resources. This requires sediment control strategies that stabilize reservoir storage capacity by balancing sediment inflow and removal rates.

Hydrosuction-dredging is an emerging removal strategy engineered to be environmentally friendly. It uses the potential energy stored by the hydraulic head at the dam—measured as the difference between the upstream reservoir surface elevation and the river surface elevation on the downstream side of the dam—to draw sediment-entrained reservoir water into a sediment-removal pipeline for transport downstream. One end of the pipeline is situated at the sedimented reservoir bottom upstream from the dam. The pipeline then extends through the dam to a discharge point downstream. Because hydrosuction dredging does not rely on diesel power pumps to transport sediment, fossil fuels are conserved and oil spills in drinking water reservoirs averted. It has been used to remove sediment successfully in China, France, and Italy.

Engineering studies have investigated the physical capacity of hydrosuction dredging to remove sediment-entrained reservoir water based on parameters such as reservoir elevation, pipeline diameter, and length. This seminar focuses on the next logical concern: Given that hydrosuction dredging requires impounded water that is then unavailable for other profitable consumptive activities (e.g., hydropower generation, irrigation, etc.), what are the economic rules governing the optimal volume of reservoir water to allocate to this sediment-removal strategy over time?