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River Morphology and Sediment Management Strategies for Sustainable Reservoir in Japan and European Alps

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What is the future for reservoirs? Surely the water can't just "run out" can it? Yes. Over time reservoirs have filled in with sediments, limiting the amount of water that can be stored, as well as impairing the water quality. Alpine regions can be characterized by high energy potential and characteristic landform elements, high elevations, steep slopes, rocks, and availability of snow and ice. Sedimentation rates of alpine reservoirs in average are smaller than those of lowland facilities. Nevertheless the loss of storage capacity may have dramatic consequences as singular events in the alpine environment may carry extreme amounts of sediments in a very short time. Moreover, the mean lifetime of reservoirs is greatly shortened by the accumulation of sediments coming from the rivers feeding into them.

The key objective is to investigate the morphological processes and the mutual interactions between deposition and flow pattern which are the templates for the establishment of aquatic and riparian ecosystems. The paper aims at identifying, measuring technique to assess the risk of reservoir siltation with and without countermeasures in Japanese and European Alps. Furthermore, analyzing how human interventions and climate changes may alter sediment fluxes, morphological patterns and in river basin system. Sustainability of Alpine reservoirs is severely threatened by sedimentation resulting from natural geomorphologic processes. The sustainability of reservoir should seek to balance sediment inflow and outflow across the reservoir while maximize the long-term benefits, the concept of sustainability is shown in Figure 1. Analysis of each facilities and proper maintenance sustainable reservoir management under the limited budget will be conducted.

Figure 1. Concept of a sustainable alpine reservoir

In the frame of an international established project called Sustainable Sediment Management of Alpine Reservoirs considering ecological and economical aspects ALPRESERV. Within the EU Interreg IIIB project, ALPRESERV 17 project partners from 5 alpine countries worked together to develop and evaluate a sustainable sediment management and economic issues, and de-sedimentation options. Maintaining the “Healthy Life of the River Basin” is the ultimate goal of the paper by applies integrated sediment management, to realize the sustainable utilization of water resources and ecological environment protection, and achieve harmony between humans and nature. This may involve strategies to minimize sediment inflow, enhance sediment release, or a combination of several countermeasures.