

Dam decommissioning with stochastic salvage value

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Reservoirs are one of the most common forms of nonrenewable resources, yet their economic studies have been rare. Years after large dams were built en masse, engineering literatures began to realize that even when reservoirs were structurally sustainable, they would nevertheless become unsustainable for reasons such as sedimentation accumulation. The loss of storage due to sediment accumulation is nontrivial and alarming.

Our goal in this paper is to formally represent the reservoir management problem, taking into account the stochastic nature of salvage value of the dam at the time of its decommissioning. The formalization also provides us the following three major insights:

1. Ranking of different sedimentation removal techniques from the perspective of their impact on the age of dam. We differentiate between economic life, usable life, and the general life of dam, using the terminology of Murthy (1977).
2. Optimal sedimentation management is retrieved as a result of a control problem of the operator.
3. The value of the dam at any point. At the end, given the parameters of the model we calculate optimal dam size.

We contribute to the literature in the following way. This paper is the first one to look at the sedimentation issue as a discrete continuous model in a stochastic framework. Our model is rich in that it allows us to not only compare different sedimentation techniques from the perspective of their impact on reservoir age and the overall value of the reservoir, thus allowing us to rank the techniques, but also provides a framework to analyze the impact of uncertainty on these values.

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