

Review of *Reservoir Sedimentation: Assessment and Environmental Controls* by Kumkum Bhattacharyya and Vijay P. Singh

CRC Press, Boca Raton, FL; 2019; ISBN 9781138493636; 322 pp.; \$149.95.

Rao S. Govindaraju, Ph.D., P.E., D.WRE, P.H.,
Dist.M.ASCE

Professor, Lyles School of Civil Engineering, Purdue Univ., West Lafayette,
IN 47907. Email: govind@purdue.edu

[https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0001834](https://doi.org/10.1061/(ASCE)HE.1943-5584.0001834)

Sedimentation in reservoirs is a chronic problem affecting their capacity and thus their sustainable use. Periodic monitoring to assess capacity and costly dredging operations are some of the high maintenance costs associated with reservoirs. Reservoir operations are continually subjected to new stresses from increased water demands due to rising populations and agriculture. These problems are further exacerbated by the uncertainty that climate change brings through increased variability among floods and droughts. The goal of this book is to shine a spotlight on the critical roles that dams play in our society, what challenges face us, and how the scope of reservoir management will have to change in order to account for these new stresses and large uncertainties.

Sedimentation, with India providing the context, is the subject of the first chapter of this book. While sustaining human civilizations through judicious use of water, reservoirs have come at the cost of depleting sediment supply to downstream locations, reduced hydropower, declining freshwater resources, land subsidence, and loss of biodiversity and coastal lands. The second chapter highlights these issues with a commentary on reduced sediment fluxes to the world's oceans from dam construction and the resulting consequences.

A holistic management of reservoir operations would not focus on the reservoir alone, but also on practices within the contributing watershed. The sedimentation literature is reviewed in the third chapter, which also outlines the steps of identifying the study

area and data sources, gathering data, and the methodology to be adopted before a reservoir management plan can be put in place. Measurement techniques for sedimentation along with storage losses are discussed here. The fourth chapter explores reservoir sedimentation rates further with a discussion on reservoir sedimentation characteristics and sedimentation hot spots, and explores the relationship between management practices in the catchment area and sedimentation.

Sediment yield is affected by a multitude of factors such as rainfall, soil properties, surface topography, and drainage properties as well as anthropogenic practices of land management. Using examples from India and other countries, the fifth chapter describes how these factors influence reservoir sedimentation.

The sixth chapter focuses on effective sediment management to control both the influx of sediment into the reservoir and the deposition and settlement of sediment in the reservoir. Management strategies such as sediment traps, catchment erosion control, drawdown operations, off-stream reservoirs, and sediment bypass are discussed. Special attention is placed on operations including dredging, excavation, and hydraulic flushing. A life-cycle management approach is recommended to promote reservoir conservation.

The seventh chapter frames the problem of sedimentation in the context of climate change as well as environmental and ecosystem changes and how they are likely to affect reservoir management when sedimentation is likely to be exacerbated. Holistic approaches to water management are presented.

The primary audience for this book would be decision makers for water management and reservoir operations. This book would also be recommended to practitioners who want to understand reservoir management and sedimentation by reviewing what has been learned from past dams and reservoirs. Academics would find the case studies of interest, as would young researchers wanting to educate themselves on the multiple aspects of reservoir sedimentation.