

Chapter 9 Highlights

1. Dams and reservoirs are used for many purposes, including instream uses and water storage for offstream uses. Satisfying these different uses requires careful reservoir operation.
2. We have built an astonishing number of dams; even the US National Inventory of Dams, with its 90,000+ structures, is an undercount. In the US, the era of dam-building ended in the late twentieth century, in part because of changing societal attitudes towards dams. In contrast, many LMICs are rapidly building large dams, some of which are encountering significant local and international opposition.
3. Despite continued dam construction, reservoir storage volume—a metric of our resilience to hydrologic variability—has declined on a per-capita basis due to population growth and **reservoir sedimentation**.
4. Probably the most significant global impact of dams has been the displacement of tens of millions of people, often river-dependent indigenous communities, who have been forcibly resettled on marginal lands without adequate compensation.
5. Other negative impacts of dams include: flooding of cultural, archeological, economic, and ecological resources; damage to rivers, fish, and river-dependent lifestyles; risk of catastrophic dam failure and **reservoir-induced seismicity**; and greenhouse gas emissions.
6. Data on existing large dams suggests that dam planners tend to under-estimate costs and over-estimate benefits, to the point that perhaps half of all the large dams that we've built don't make economic sense, even ignoring social and environmental costs.
7. Different dams have very different distributions of benefits and costs. If we are going to build dams, we should build only the best dams, but in practice, we continue to build **Pareto-inferior** dams.
8. Some of the impacts of dams can be mitigated by managing them for environmental flows, **sediment passage**, and **fish passage**, although fish passage techniques have proven less effective than hoped.
9. Dam removal is growing in scope and scale, for environmental, social, and financial reasons. Dam removal initiates a complex process of geomorphic change, but often succeed in re-establishing a free-flowing river and associated fish runs.
10. Large aqueducts are used in tandem with dams to move water large distances, often across basin boundaries, enabling large cities and irrigation projects to sprout up in arid regions that don't have the local water to support them.