Three Square Miles of Open Space: Is It Enough?

By Denise De Carion, who majored in Environmental Biology and Management, worked in Yosemite National Park as a Biological Science Technician in 2008, and participated in the 2009 Ecogeomorphology course on the Tuolumne River.

The construction of the O'Shaughnessy Dam on the Tuolumne River is one of the most highly disputed water projects in California history. The dam impounds water from the Tuolumne River into Hetch Hetchy Valley, which John Muir revered as Yosemite Valley’s twin. Advocates for its removal would like to see the valley restored for its intrinsic, aesthetic, spiritual, and ecological values. The storage capacity of the reservoir is small, but O'Shaughnessy Dam provides water of such high quality that it is exempt from federally mandated filtration and treatment requirements. Along its descent to San Francisco, Hetch Hetchy water passes through powerhouses and results in a net production of energy. The ecological and economic tradeoffs associated with restoration projects are typically evaluated based on value of ecosystem services (i.e., ecosystem processes that benefit humans). The Hetch Hetchy Valley can provide two mutually exclusive ecosystem services:

Clean water

Removing O’Shaughnessy Dam could result in little loss in water supply, but the resulting additional water treatment and the loss of hydroelectric power generation would be costly (Null & Lund, 2006). The Hetch Hetchy System is a network of storage and conveyance facilities that includes 10 reservoirs, one of which is Hetch Hetchy Reservoir. Hetch Hetchy stores only 360 of the total 1,454 thousand acre-feet in the system—roughly 25%—however, Hetch Hetchy water is so pure, it is kept separate from water of the other reservoirs. It requires only minimal treatment, and therefore water supplied by the Hetch Hetchy System to two million San Francisco Bay Area residents is both clean and cheap (SFPUC, 2004).

Open space

John Muir once wrote, “Hetch Hetchy Valley, far from being a plain, common, rock-bound meadow, as many who have not seen it seem to suppose, is a grand landscape garden, one of Nature’s rarest and most precious mountain temples (Muir, 1908)”. This veneration is the ethical basis used to argue for restoration of Hetch Hetchy Valley, which is a three-square-mile valley situated inside 1,200 square miles of Yosemite National Park wilderness. Historically, Hetch Hetchy Valley would have been a home for numerous species of plants, as well as deer, black bears, golden eagles, and peregrine falcons, so a restored valley ecosystem could boast a great diversity of native plant and animal communities (http://hetchhetchy.org). In addition, the removal of O’Shaughnessy Dam would allow the Tuolumne River flows in that reach to return to their natural spring-snowmelt-dominated hydrologic regime, which would benefit downstream communities.

What uncertainties are associated with restoring Hetch Hetchy Valley?

At its early stages of succession, the dewatered valley ecosystem could be easily compromised by invasive plants and humans. A successful restoration plan must include rigorous plans to landscape with native vegetation, minimize recreational use, and monitor continually. The degree to which the Tuolumne River would flow more naturally is questionable: Hetch Hetchy
Reservoir is only one source of water in the system; a much larger portion of water from Cherry Reservoir is released into the Wild and Scenic section of the Tuolumne River downstream of O’Shaughnessy Dam; and these unnatural flows would continue to disturb the natural spring-snowmelt hydrograph. Also, few if any fish species historically inhabited the Tuolumne River inside Hetch Hetchy Valley (Moyle), and therefore the restoration project does not possess native fish recovery goals. Regardless of these uncertainties, it seems possible for the restoration goals to be accomplished.

**Does the benefit of three square miles of open space in Yosemite Valley warrant large financial costs?**

After contrasting these two ecosystem services, I am not convinced that one is more important than the other because I value clean water, but I love the Sierra Nevada, too. I am, however, skeptical about whether the predicted benefits associated with a restored Hetch Hetchy Valley warrant the expense of an immense amount of resources. The major monetary costs would result from deconstructing the dam itself (or punching holes in it) and building roads for heavy equipment, for which the city of San Francisco would be expected to fund. All details aside, monetary cost is not necessarily a good reason to dismiss ecological restoration, so long as the returns on the investment are maximized. And it is for this exact reason—the little number of ecosystem services returned for a huge investment—that Hetch Hetchy does not qualify as a high-priority restoration project.

**How does Hetch Hetchy compare to other restoration efforts?**

At this time, environmental advocates should focus their efforts on projects with more tangible outcomes. We should advocate for restoring degraded ecosystems that can provide Californians with more bang for their bucks in terms of practicality, such as restoring the Klamath River and Estuary by removing the impoundments that extend up into Oregon. Removal of the Klamath River dams will provide hundreds of miles of salmon spawning and rearing habitat (Hamilton, Curtis, Snedaker, & White, 2005), thereby providing healthier and more robust salmon runs for local commercial, sport, and tribal fisheries. Many other anadromous species will also benefit from the reopening of this migration corridor, such as steelhead, green sturgeon, white sturgeon, eulachon, Pacific lamprey, and river lamprey. Draining the reservoirs will eliminate toxic blooms of blue-green algae (*Microcystis aeruginosa*) and improve the system’s water quality (Kann, Bowater, & Corum, 2010). While this project dons a large price tag, it could be responsible for preventing the extinction of several iconic fish species and it would have direct valuable economic returns for multiple communities.

Let’s not forget about O’Shaughnessy Dam, but let’s first restore ecosystems in California that have more problems than Hetch Hetchy Reservoir; after all, it’s still a pretty nice place to hike around. If we can successfully prioritize and execute restoration projects based on the number of ecosystem services returned, we will be able to garner more widespread support for ecosystem restoration, and I bet that in the future we will be able to justify tearing down a dam just for the sake of more open space in Yosemite National Park.
Works Cited


Moyle, P. (n.d.). (D. De Carion, Interviewer)