HIGHLIGHTS

Restoration of ecological balance in Constitution Gardens Lake:

an example of integrated resource management in an urban park

In 2002, resource managers at National Capital Parks—Central initiated a multifaceted three-year project to restore Constitution Gardens Lake, a 6.75-acre (2.6-ha) artificial water body located in downtown Washington, D.C. The lake provides a setting for some of the nation's most recognizable monuments and is the site of the 56 Signers of the Declaration of Independence Memorial. The lake also provides visitors with an escape from urban stress and is important for urban biodiversity.

Since its completion in 1976, the lake has suffered chronic ecological problems stemming primarily from its design: it is a closed, shallow system with an impermeable bottom that is entirely exposed to direct sunlight and fed by a municipal water source. From the beginning, the system's artificiality promoted an unbalanced ecology characterized by significant algal blooms and rapid sedimentation rates. These problems have been extremely difficult to manage, and costly, short-term fixes have done little to address underlying causes.

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A significant fish kill during summer 2001 prompted park managers to consider long-term solutions and develop a restoration plan that specifically addressed the root of these problems. Natural resource staff believed that restoration should incorporate integrated pest management strategies. Specifically, they determined that success hinged on (1) stabilizing the lake's physical and biogeochemical properties, (2) reestablishing the lake's biotic communities, and (3) developing an action-oriented monitoring program.

To date several major actions have been completed to stabilize the system's ecological dynamics. Specifically, to facilitate more efficient nutrient cycling within the lake, park staff dredged tremendous volumes of nutrient-laden sediments from the lake's bottom. Additionally, they removed nonnative fish species that produce large amounts of waste; this aided in reestablishment of native fish populations in spring 2002. Resource managers have also developed methods to detoxify chloramine from municipal water sources used to fill the lake.

In spring 2003, managers used several physical and biological controls in an attempt to stabilize the lake's oxygen regime and increase nutrient cycling within the system. For example, park staff installed a new circulation and aeration system to reduce stagnation and increase oxygen transfer throughout the water column. Also, staff used microbial additives to stabilize and increase microbial populations. Healthy colonies of bacteria absorb and cycle nutrients, simultaneously reducing nutrient concentrations in the water available for algal growth during the growing season and moderating sediment deposition rates. Finally, park staff constructed large underwater planters and planted native vegetation such as cattails and bull rush. A healthy plant population will help cycle nutrients and produce oxygen during warm weather while also providing cover for young fish. Sustained success hinges on a comprehensive monitoring plan based on preestablished tolerance levels for specified parameters such as nutrient concentrations, pH, and dissolved oxygen that are linked to corresponding corrective actions.

Restoration of the lake will significantly enhance Constitution Gardens as a whole and will be a model for other cities with similar urban water bodies. However, resolution of the problem is complex. Not only do many of the factors involved act synergistically, but management actions tend to receive intense public scrutiny because of the lake's prominent location. Despite these challenges, long-term, cost-effective management of the lake is well within the capabilities of park resource managers.

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