Restoration and Reclamation Review
Student On-Line Journal
Vol.1, No.1, Spring 1996
Department of Horticultural Science
University of Minnesota, St.Paul, MN

Restoring the Anacostia River

Patty Hoch

INTRODUCTION

The Anacostia River, in Washington D.C., is a small heavily-polluted tributary of the Potomac River. This 170-square-mile urban stream system is located in one of the most densely populated areas in the United States. In 1984, the state of Maryland and the District of Columbia signed the Anacostia Watershed Restoration Agreement, which signaled the beginning of the rehabilitation efforts on the Anacostia.

The Anacostia restoration project is a very daunting undertaking for various reasons. First, the watershed is located in both Maryland and the District of Columbia, with a combined population of about 600,000 people. Numerous political jurisdictions are transected by the watershed's boundaries, necessitating input from a large number of interests. Over 60 government agencies, including the U.S. Army Corps of Engineers, the Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the National Park Service, are involved with this restoration (In the Anacostia Watershed, Fall 1994). A second challenging feature of this project is that the river's hydrology is such that the flow is very slow, amplifying the effects of pollutants in the waters. In faster flowing rivers with steeper gradients, contaminants and sediments are transported downstream more quickly than those pollutants in the Anacostia. In addition, the river is connected to the tidal system of the Chesapeake Bay creating a tidal embayment about 6.4 miles upstream from the Potomac River. During dry months water retention can extend to 100 days or more (Graber and Graber, 1992). Another aspect of this restoration project is the fact that this river system is located in a heavily-developed, urban region. With urbanization comes increased runoff, sedimentation and habitat destruction, further complicating rehabilitation efforts.

In 1988, the House Committee on Public Works and Transportation commissioned the United States Army Corps of Engineers to conduct a reconnaissance study on the Anacostia River to review water resources problems in the watershed (Water Quality of the Anacostia River, Washington, D.C., July 21, 1991). A year-long study was completed in 1990, which determined that the primary problems were the result of urbanization and past Corps of Engineer activities.

The Corps had been involved with the Anacostia River for over 115 years (Water Quality of the Anacostia River, Washington, D.C., July 21, 1991). Flood control, navigation, debris-removal, and aquatic vegetation control were included in the Corps activities. Between the years of 1902-1940, the river was channelized in the Washington D.C. stretch and seawalls were constructed. During this time, more than 1000 acres of wetlands were filled with dredged material. The 1950's saw further habitat destruction through loss of wetlands and channelization (Water Quality of the Anacostia River, Washington, D.C., July 21, 1991). It is

estimated that from 1902-1960, Corps activities destroyed ~2600 acres of wetlands, 99,000 linear feet of aquatic habitat, and 700 acres of bottomland hardwood in the Anacostia Watershed (In the Anacostia Watershed, Fall 1994). These losses, along with extensive urbanization, have caused the severe degradation of this basin.

The Anacostia Watershed Restoration Committee (AWRC), a group formed to coordinate the dozens of involved agencies, composed an action plan to rehabilitate the Anacostia River by the year 2000. This plan consists of six specific goals set forth for improvement of this basin. The goals are as follows: 1) Dramatically reduce pollutant loads in the tidal estuary to measurable improve water- quality conditions by the turn of the century; 2) Restore and protect the ecological integrity of degraded urban Anacostia streams to enhance aquatic diversity and encourage a quality urban fishery; 3) Restore the spawning range of anadromous fish to historical limits; 4) Increase the natural filtering capacity of the watershed by sharply increasing the acreage and quality of tidal and non-tidal wetlands; 5) Expand the forest cover throughout the watershed and create a contiguous corridor of forest along the margins of its streams and rivers; and 6) Make the public aware of its role in the Anacostia cleanup and increase citizen participation in restoration activities (In the Anacostia Watershed, Fall 1994).

Combined sewer overflows (CSO) have been cited as the major source of biochemical oxygen demand (BOD) and organic pollution to the Anacostia (Graber and Graber, 1992). Combined sewers are designed to transport sanitary waste to the treatment plant, but they also carry stormwater runoff to the river. During storm events, both the stormwater and raw waste are diverted directly to the Anacostia. This occurs 30-40 times per year (Graber and Graber, 1992). Thirty five percent of the District of Columbia is served by these CSOs (Graber and Graber, 1992). Replacement of combined sewers with a separated system would greatly benefit the Anacostia, but cost an estimated $15 billion (Graber and Graber, 1992). As a less costly alternative, the Environmental Protection Agency (EPA) developed the swirl concentrator. This technology consists of a tank into which the combined sewage flows by gravity. The solid waste sinks to the bottom and is routed to the local treatment plant. The remaining clear liquid is disinfected and then discharged into the Anacostia. The swirl concentrator was designed for minimal maintenance with few moving parts. The cost of this system was approximately 30 million dollars, which includes prototype design and performance evaluation (Graber and Graber, 1992). The swirl concentrator is expected to reduce the annual combined sewer overflow by 50-70% (Graber and Graber, 1992). Also, 159 sites, controlling 20% of the watershed, have been proposed for modification of stormwater facilities. Fifty projects are currently in progress (In the Anacostia Watershed, Fall 1994). The Washington Suburban Sanitary Commission has contributed $15 million to rehabilitate the sanitary sewer network in the Anacostia Basin (In the Anacostia Watershed, Fall 1994).

Sedimentation is another serious threat to water quality in the Anacostia. Soil erosion from construction, poor land use, and surface mining are the main sources of sediment in the river (Graber and Graber, 1992). Control methods to deter

erosion in construction include sediment basins, temporary seedlings, straw bales and diversion dykes. In addition, storm water holding tanks have also been constructed at some sites in the watershed to prevent sediment-laden overflow from entering the waterways.

As part of the Anacostia restoration, the river's tributaries have undergone habitat improvements. This has been accomplished through more stringent sediment-control practices and construction of pool and riffle habitats. Further, one fish barrier was removed in 1994 with eight other barriers scheduled to be removed or modified in the future (In the Anacostia Watershed, Fall 1994). In the 1970s, as many as 25 barriers to fish migration were present in the lower Anacostia River (In the Anacostia Watershed, Fall 1994). Fish species have been successfully reintroduced in some Anacostia tributaries. Seventeen fish species have been reintroduced into Sligo Creek and are surviving (In the Anacostia Watershed, Fall 1994). In 1988, the District of Columbia began to require fishing licenses, which provides revenue for further fisheries program such as monitoring of species' quantity and quality, and public education programs.

Progress is also being made in wetland creation. It is estimated that 98% of the tidal wetlands and 75% of the basin's freshwater wetlands had been destroyed by 1987 (In the Anacostia Watershed, Fall 1994). Thirty acres of freshwater tidal marshes were constructed in the Kenilworth Marsh area, which is the site of the last remaining stand of original tidal marshes in the basin. Adjacent to this wetland are the Kenilworth Aquatic Gardens, operated by the National Park Service. The aquatic gardens provide habitat for plants and wildlife rare in the remainder of the District. Approximately 138 acres of wetlands have been, or are in the progress of, being created in the Anacostia basin. In addition, the District of Columbia and the Corps of Engineers will be restoring a 46-acre marsh in the area of Kingman Lake. Thirty acres of fringe marsh are proposed to be created along the Anacostia's main branch with an additional 30 acres of freshwater wetland sites identified for the Northeast Branch (In the Anacostia Watershed, Fall 1994).

The goal for increased forest cover is also seeing some success. Approximately 50% of the forest cover in the watershed had been destroyed by urbanization (In the Anacostia Watershed, Fall 1994). Fifty acres in the basin have been reforested, triggered by mitigation requirements. Additionally, an estimated four miles of riparian reforestation is proposed by the Beltsville Agricultural Research Center (BARC) on the site of their federally-owned facility. Also, the District hired their first urban forester in 1991 and the Maryland Department of Natural Resources appointed an Anacostia forester in 1993 to help oversee the project. It is estimated the about 100 acres of upland areas were reforested between 1988-1991 (Water Quality of the Anacostia River, Washington, D.C., July 21, 1991). I was unable to find specific information on the reforestation strategy. It is unclear whether the parties involved will be conducting an actual restoration of the riparian zone or rather a reclamation. The Metropolitan Washington Council of Governments (COG), one of the many agencies working on this project, is working with the Earth Conservation Corps to collect native seeds to propagate trees for use in the watershed. No other

information was available on the riparian zone reforestation plan. This phase of the restoration project will benefit the Anacostia River through reduced runoff, shading, and canopy interception.

No restoration effort can be truly successful without public involvement and stewardship. This is the final goal of the Anacostia restoration plan. The river flows through an economically-depressed, inner-city area. Efforts to raise public awareness about ecosystem health and stewardship include school programs which provide hands-on ecological experience for local school children. Quarterly educational newsletters have been distributed to ~70,000 people in the area (In the Anacostia Watershed, Fall 1994). Adopt-a-Stream programs have also been established in the region to promote awareness of local conditions on the Anacostia and its tributaries. Another group, Save Our Streams, is training volunteers to monitor construction sites and report sources of excessive erosion and mud pollution (Graber and Graber, 1992). Various youth groups have also been instrumental in debris removal. The Interstate Commission of the Potomac River Basin (ICPRB) has been a driving force in promoting public outreach programs as has COG, who developed a volunteer program designed to implement small-scale restoration projects. As an illustration of the significance of the grass-roots level involvement, the rehabilitation efforts of the Chesapeake Bay (which is the political driving force behind the efforts on the Anacostia), began through the persistent efforts of ~200 watermen who saw their livelihood in jeopardy due to continued pollution of the Bay. This proves that concerned citizens can make a significant impact on improving and protecting their resources.

The restoration of the Anacostia River Basin must be a long-term commitment. Government agencies and citizen groups need to realize that such a major rehabilitation will require adequate time for the river to recover. The AWRC has set their goals for the year 2000. I believe this an unrealistic goal. Significant progress can be, and has been, made in reaching their goals, but these projects must be viewed in terms of decades before restoration success can truly be measured. The Anacostia watershed restoration effort has been designated a "National Ecosystem Management Model" and will serve as a prototype for future urban stream restorations (In the Anacostia Watershed, Fall 1994). While it is recognized that each river system is unique and will have problems specific to it, a model restoration watershed will prove valuable for other urban river projects.

The progress of the Anacostia restorations is being monitored by the government agencies involved. The extent to which the six goals, outlined in the restoration plan, are met will determine success. The District of Columbia has a monitoring program, which has been in place for years, where they regularly collect samples from 29 locations along the Anacostia to measure water quality. In addition, special surveys are conducted to analyze fish tissues for the presence of toxins. It has also been suggested by Ted Graham, former director of the AWRC, that emphasis should be placed on bioassessment and biocriteria for evaluation and managing watersheds (In the Anacostia Watershed, Fall 1994). In addition to current water quality standards, biological indicators of stream health

should be included. Currently, the EPA, as well as the U.S. Geological Survey (USGS), are establishing programs in an attempt to monitor and evaluate the Nation's surface and groundwater resources. EPA's version is called the Environmental Monitoring and Assessment Program (EMAP), and the USGS is developing the National Water-Quality Assessment Program (NAWQA). EMAP focuses on four levels of indicators: response, exposure, habitat, and stressor. The response indicator observes the biological condition of the resource such as fish assemblages or chlorophyll a as an indicator of algal biomass. Exposure indicators look at contact with a physical, chemical, or biological stressor like contaminant concentration or tissue residue of contaminant. Conditions required to support an organisms or ecosystem, such as stream substrates or a specific lake morphology, are the habitat indicators. Finally, the stressors are natural, environmental or management hazards that affect changes in exposure and habitat indicators. Examples of stressors are climate and fertilizer use. NAWQA is based on similar, but more in-depth observations of the ecological resource. Both EMAP and NAWQA are in the preliminary stages, but some sort of biological monitoring program should be implemented for the Anacostia restoration study to determine long-term success.

CRITIQUE

The Anacostia watershed restoration is a very ambitious and admirable effort. It is encouraging to see that so many government entities - State of Maryland, District of Columbia, Montgomery and Prince George's Counties, Environmental Protection Agency, National Park Service, and the U.S. Army Corps of Engineers - can effectively interact to progress toward accomplishing their goals. While it remains to be seen whether all goals will see success, major strides have been made since the Corp's reconnaissance study was completed in 1990. The new stormwater treatment technology, the swirl concentrator is evidence that updates in current waste-treatment technologies can result in major water quality improvements. Federal and state funding for the project reflect the attitude that these urban restoration efforts are an important investment in the future.

I would suggest additional evaluation of project success as outlined by G. Mathisa Kondolf. Since river restoration is a relatively new science, much is still unknown. Many of the aquatic habitat enhancement projects completed to date have failed. Some reasons for failure are short-term commitments by the funding agencies, lack of baseline data needed to understand the system, and failure to consider the hydrology of the site. Kondolf compares restoration efforts to flood control practices of the past - good intentions, but river systems cannot be easily predicted. Therefore, long- term commitments of at least a decade are required to truly monitor success. In addition, data should be collected for as long as possible prior to any restoration activity to provide a baseline for comparison. Further, the use of a reference stream would also be helpful in monitoring success of the project (Kondolf, 1995).

Restoration success will occur only if the local people take an interest in the

watershed and are willing to act as "watch dogs" for its abuse. In an area as heavily-populated as the Anacostia Basin, continual maintenance and monitoring will be required.

REFERENCES

Graber, B.P., and C.J. Graber. 1992. Rehabilitation of Urban River Ecosystems. Lessons from the Anacostia and Potomac. Pp. 349-378 in Ecosystem Rehabilitation Vol.2: Ecosystem Analysis and Synthesis. SPB Academic Publishing by The Hague, The Netherlands.

Gurtz, M.E. 1994. Design of Biological Components of the National Water-Quality Assessment (NAWQA) Program. Pp. 341-354 in S.L. Loeb and A. Spacie, eds., Biological Monitoring of Aquatic Systems. Lewis Publishers, Boca Raton, FL.

In the Anacostia Watershed. Fall 1994. Vol VII, No. 3. Interstate Commission on the Potomac River Basin.

Kondolf, G.M. 1995. Five Elements for Effective Evaluation of Stream Restoration. Restoration Ecology, Vol. 3, No.2, pp. 133-136.

Paulsen, S.G., and R.A Linthurst. 1994. Biological Monitoring in the Environmental Monitoring and Assessment Program. Pp. 297-341 in S.L. Loeb and A. Spacie, eds., Biological Monitoring of Aquatic Systems. Lewis Publishers, Boca Raton, FL.

U.S. Dept. of the Interior. 1984. Kenilworth Park and Aquatic Gardens Development Concept Plan.

Water Quality of the Anacostia River, Washington, D.C. July 24, 1991. Hearing before the Subcommittee on Water Resources of the Committee on Public Works and Transportation.