

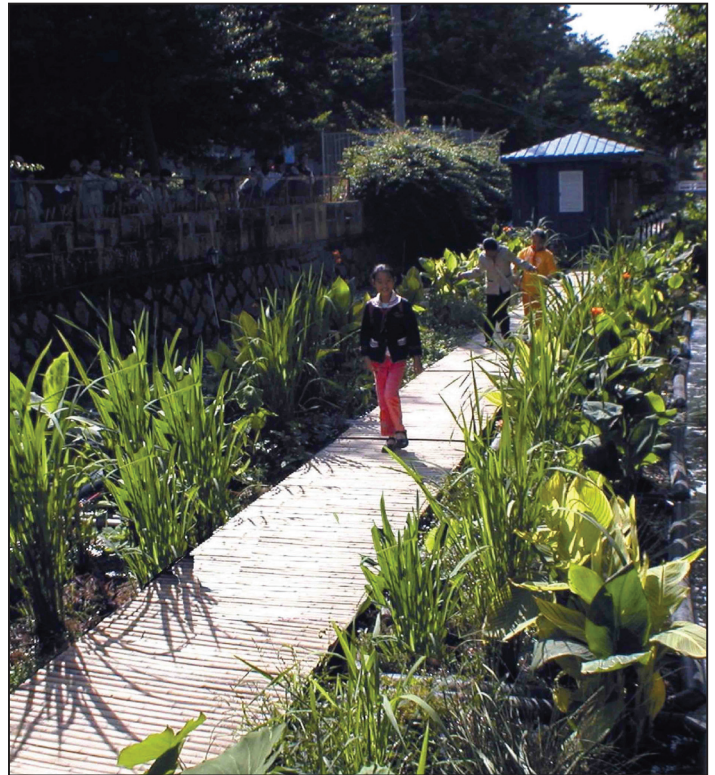
Urban Municipal Canal Restorer Fuzhou, China

Fuzhou, a city of 6 million people, empties its commercial wastewater and sewage into an 80 kilometer network of canals throughout the city before emptying into the Minjiang River. The polluted canals are a health risk for the city's inhabitants and threaten the livelihood of fishing communities downstream.

A 600-meter canal named Baima, considered one of the worst in the city, had extreme problems with odor and floating solids created by the influx of 750,000 gallons per day of untreated domestic sewage. Rather than re-piping the polluted water to a remote wastewater treatment facility, the city government sought an affordable and low maintenance treatment system within the canal itself.



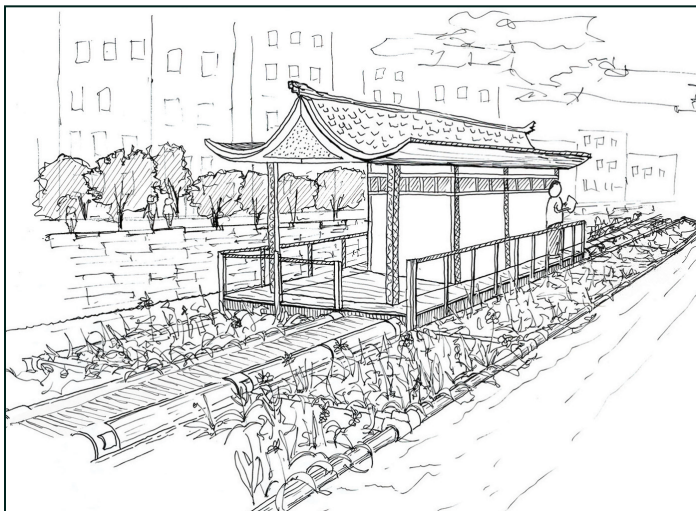
Raw, untreated sewage in the Baima Canal before Restorer installation.



The Baima Canal Restorer also functions as a community walking bridge.

In 2002, John Todd Ecological Design collaborated with Ocean Arks International to design a Restorer for their Chinese partners on the Baima canal using 12,000 plants composed of 20 native species. Constructed with a walkway down the center, the Restorer has met water quality goals and created a prized recreation area for the members of the community.

The City of Fuzhou's wastewater issues are typical of many developing world cities. The odors from the Baima Canal in particular were a major issue with adjacent temples, elementary school, and many residential apartment buildings. A 500-meter linear Restorer was installed in the summer of 2002. The plant root zones and fabric media of the Restorer provide biophysically diverse surface areas necessary for effective biological treatment of wastewater.



An artistic rendering of the Calan Restorer Pagoda

Wastewater entering the end of the canal is recycled to the top of the canal for treatment. An anoxic zone at the top of the canal allows for denitrification. The fine bubble aeration system distributes air along the canal from blowers located on a central floating barge. Low-intensity and uniformly distributed aeration circulates the water while forcing it past biologically active zones. The Restorer automatically inoculates the system with beneficial bacteria at two locations. A variety of bacteria species were selected specifically for their ability to aid in sludge and grease digestion as well as nitrogen removal.

| Design Treatment Standards and Preliminary Results for Restorer Estimated Flow: 750,000gpd | | | | |
|---|----------|-----------------|---------------------|-----------|
| | Influent | Effluent Design | Preliminary Results | Reduction |
| COD mg/l | 480 | <50 | 40 | 92% |
| BOD mg/l | 240 | <30 | 19 | 92% |
| NH3 mg/l | 40 | <15 | N/A | N/A |
| TSS mg/l | - | - | 20 | - |



Flowering plants now line the walkway Restorer, reflecting both the form and function of the design.

Performance and Results

The Restorer system successfully met the goals set by the City of Fuzhou. The Restorer was able to reduce odors, eliminate floating solids, and drastically improve the aesthetics of the neighborhood. Furthermore this technology reduced the negative impact of the pollutants in the canal on downstream aquatic ecosystems. The clarity of the water in the canal increased from less than 6 inches to several feet, while meeting several secondary effluent standards.