

# The Reclamation Project A Participatory Eco-Art Effort to Restore Mangrove Habitat in SE Florida

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## ABSTRACT

### Miami. A Growing Coastal Metropolis

The population of Greater Miami approaches 5.5 million making it the 8<sup>th</sup> most densely populated urban area in U.S. (U.S. Census, 2000). In addition, the core urban zone is only 20 miles wide; bordered by Everglades National Park to west, Atlantic Ocean/Gulf Stream to east, Florida Keys to south. These factors, exacerbated by development that is concentrated in coastal areas puts excessive stress on the area's coastal resources.



#### Threats to Miami's Coastal Wetlands

Miami's coastline consists primarily of highly fragmented mangrove wetlands and sandy coasts. While coastal development is relatively stabilized, local mangrove wetlands face other pervasive threats. Invasive plant species, most of which were intentionally propagated in the first half of the 20<sup>th</sup> century are widespread. Many thrive even in saline environments. The most widespread in coastal areas are Australian pine (*Casuarina equisetifolia*) and Brazilian pepper (*Schinus terebinthifolius*), with individual plants producing hundreds of thousands of wind dispersed seeds a year. The only effective remediation is mechanized removal which is costly and due to the size of bulldozers and equipment, limits access to coastal areas.

Land based pollution is another threat to mangrove wetlands. Poor water quality adversely affects mangroves because much of their body mass lies underwater. Marine debris is also problematic. Removing flotsam once it has entered the back waters of a mangrove wetland is a challenge.

#### Challenges to Bioremediation and Outreach

South Florida lacks an effective and universally appealing environmental outreach message in a community that shares various languages and cultures. Poverty in urban Miami and a lack of access to coastal areas by residents is also detrimental to bioremediation efforts. Some residents living in inner city areas no more than five miles from the coast, have never seen the ocean.

Bioremediation at remote coastal sites is limited to affluent, coastal residents who often perceive a conflict of interest regarding the restoration of coastal habitats that obstruct waterfront views.

### Eco Art

Eco-art evokes the creation of objects as well as the instigation of processes toward bioremediation. It advocates for scientific discovery through visually engaging art products and processes while animating communities toward direct involvement in environmental stewardship.

The Reclamation Project uses art as a universally accessible tool to engage local residents to restore coastal habitat. The Project is fully participatory from seedling collection to exhibition to replanting. Through art the Project expresses complex environmental conundrums such as coastal degradation and climate change in a way that is simple, visually engaging and memorable. Eco-art installations at schools, retail stores and museums promote dialogue about coastal health issues.

Further, the Project provides ample experiences for residents to conduct hands-on restoration in coastal areas.



A sixth grade student at Gibson Charter School in downtown Miami and her mangrove propagule. Eco-art installations remain at the school throughout the school year.

### Results

Since 2006 over 11,000 propagules covering seven acres of new habitat have been replanted by over 600 volunteers at two sites on Biscayne Bay, an urban estuarine lagoon. The two restoration sites are Virginia Key, a barrier island off the coast of Miami and Snapper Creek, a brackish waterway in SE Miami-Dade County. Dredging of the creek several decades ago left a bare creek bank that is being remediated by DERM as a Red and White mangrove wetland.

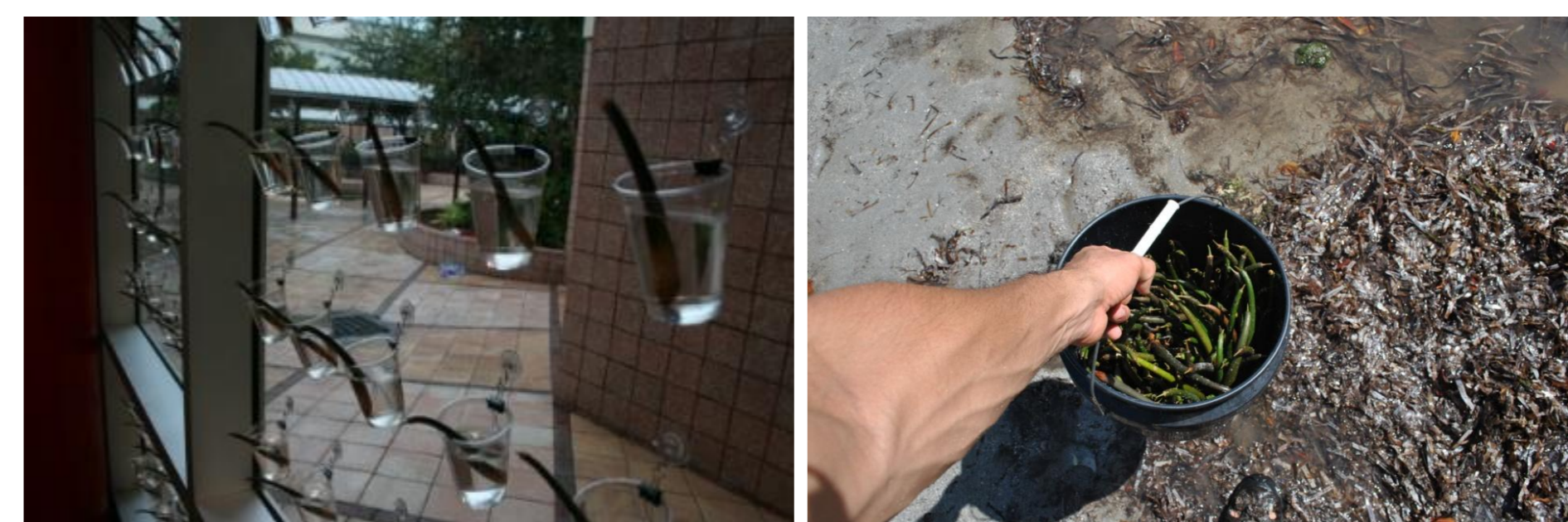
Ninety five retail stores in Miami adopt mangrove installations every year and 13 schools maintain their own eco-art installations, all at no cost to the host institution apart from general program administration and the cost of biodegradable plastic cups.

In Martin and St. Lucie Counties, where 20 local organizations participate, 1,500 propagules have been replanted. In Hillsborough and Pinellas Counties (Greater Tampa Bay), around 1,000 seedlings were replanted in 2008.

Post restoration monitoring is being conducted at present through photography and estimation of seedling mortality through counting. As seedlings mature, additional post monitoring protocols will be employed.

The Reclamation Project ([www.reclamationproject.net](http://www.reclamationproject.net)) is a participatory eco-art based coastal restoration effort. Volunteers collect Red mangrove (*Rhizophora mangle*) propagules during fruiting season in August and September. These are displayed inside clear plastic cups filled with tap water along a modernist art grid on walls and windows at schools, museums and retail stores. These installations represent a metaphoric reclamation of Miami by the mangrove forests that once occupied South Florida before major urban development commenced in the 1920s. The propagule/cups double as environmental outreach tools and a nurseries where seedlings germinate. After a 4-6 month germination period, volunteers replant these propagules at sites cleared and irrigated by the Miami-Dade County Department of Environmental Resource Management (DERM), creating new coastal wetland habitat where invasive plants once predominated. The Project combines art, science, bioremediation and community activism and is 100% volunteer based.

The Project is the brainchild of local artist, Xavier Cortada. It is administered at Miami Science Museum which hosts a 1,100 seedling installation at its Wildlife Center. Every year since 2007, these seedlings and others displayed at schools and retail stores are replanted along Biscayne Bay. To date 11,000 mangrove seedlings, representing over seven acres of restored habitat, have been replanted by volunteers in Miami-Dade County. Four other Florida counties participate (Martin, St. Lucie, Pinellas, Hillsborough) illustrating the viral popularity of this highly practical and cost effective project.



Left. Eco-art installation at Tampa Prep school. Right. Collection of propagules at Crandon Park, Key Biscayne

### Mangroves and SE Florida

There are over 50 species of mangrove on Earth, representing 17 different families (Hogarth 2007). Mangroves worldwide do not share a common ancestor but rather exhibit convergent evolution. Mangroves have adapted to withstand saline environments and in most cases low oxygen conditions. Mangroves, therefore, are characterized by their ecology and not their taxonomy (Hoff et al., 2010). They are cosmopolitan, found in tropical environments throughout the world.

The Red mangrove (*Rhizophora mangle*) is a common mangrove species in the Western Hemisphere. Florida represents the northern range of this species which occurs as far south as Brazil. In the US, the Red mangrove inhabits both the Atlantic and Gulf coasts of South Florida. In Florida and most parts of the Caribbean it coexists with two other mangrove species, the Black mangrove (*Avicennia germinans*) and the White mangrove (*Laguncularia racemosa*). These three species exhibit particular coastal zonation with Red mangroves inhabiting areas closest to the ocean or estuary and the White mangrove a more inland species. Black mangroves often live in close harmony to Red mangroves but are generally unable to withstand the highest salinities and wave action.

Mangroves are incredibly important ecosystems in South Florida. They provide habitat for native birds, mammals and reptiles and act as a nursery for marine organisms. The ecological services they provide to a growing human population are equally critical. They:

- Trap and cycle organic materials and nutrients and stabilize coasts
- Provide habitat and nursery grounds for a wide variety of organisms above and below the water line
- Serve as storm buffers by reducing wind/wave action
- Cleanse water by filtering runoff and trapping sediments and debris
- Support sport and industrial fisheries
- Provide nutrients for associated species and habitats (seagrasses and coral reefs)

A pioneer species, they are unique in that they create terrestrial, avian and marine habitat. In their absence, relatively homogenous habitats such as sandy beaches would predominate.

Red mangrove propagules constitute ideal planting materials for volunteers engaged in field based bioremediation (Milano 1999). Adult trees produce copious amounts of propagules and are easily handled and transported. Further, Red mangroves are not an endangered species, making collection permits relatively easy to obtain. Mortality post restoration is low and within 2-3 years, seedlings have extended small pop roots. These factors make this species an ideal candidate for coastal restoration efforts and speak to the merits of this plant as an attractive art piece.



Left. A Red mangrove seedling one year after replanting. Right. A Great Blue Heron wades in newly restored Red mangrove habitat on Virginia Key, Florida.

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