

**MAGNIFICENT MANGROVES  
A COASTAL PLANT RECOVERY PROJECT**

Geoffrey C. Lane  
Director, Marine Life Adventures!  
Clearwater Marine Aquarium, Clearwater, FL

**ABSTRACT**

Sustaining our coastal resources in the new millennium will best be accomplished by forging new, non-traditional partnerships between the government and the private sector.

**OBJECTIVE**

As part of a \$95,000 grant from the US Environmental Protection Agency, the Clearwater Marine Aquarium (CMA) has formed a partnership of local governments, private businesses, and the State of Florida. Each partner contributes in-kind services, money, or personnel to help eliminate exotic plants such as Brazilian pepper (*Schinus terebinthifolius*) and replace them with native vegetation such as red mangrove (*Rhizophora mangle*). The project is divided into five components, each with a subset of objectives.

In the first component, Pinellas County School District teachers and educators attended a Marine Plant Communities Workshop designed to give information incorporating marine plants into their curricula. Non-Pinellas communities will be able to access the plant curriculum via CMA's web site.

The Pinellas County School District has a publication, Catalog of Choice, all teachers receive when they return from summer vacation. It was felt this would be the most effective way to reach the science and social studies teachers, our target audience. We did not want to exclude other teachers however, especially if other teachers wanted to include environmental studies as an integrating context to their curricula. Additionally, we agreed to have a Marine Life Adventures (MLA) staff member available for a county in-service day in which information about the project and goals would be given. We like to work closely with the local school district to become a resource for educators, and to ensure the quality of CMA/MLA programs so that they meet the state standards. Since we hope this project will become a model for other areas, we have also begun to concentrate on the seven nearest counties for our programs.

In the second component, 125 people from the Clearwater Brownfields area living within the Stevenson's creek watershed will participate in free 2-day Marine Life Adventures Classes designed to raise their awareness of the marine plant communities and involve them in restoration of this impacted area. This Brownfields area is one of the most economically depressed in the City of Clearwater, having an unemployment rate around 9% with 27% of the residents living below poverty level. These classes will give participants the opportunity to develop a sense of ownership and stewardship plus help them define their role in the preservation

of the watershed in which they live. The curriculum for this component will also be available on CMA's web site. We hope that we will be able to recruit a core of volunteers from the Brownfields area to help maintain the restored areas.

In the third component, a prototype Mangrove Planter Box will be designed, built, and installed at Honeymoon Island SRA.. The box will be a new design intended to soften and protect seawalls while providing wildlife habitat and recreating mangrove fringe. Eventually, the box design will become available to others as a possible mitigation project.

Problems facing us would be construction and placement of the planter box, and permitting issues. Since we were providing mitigation by removing the Brazilian pepper trees at the site, we received a *Minimus Exemption* through Florida's Department of Environmental Protection. The size and portability of the box was seen as a method to increase the mangrove fringe community.

For the fourth component, a Mangrove Display will be built at the Aquarium. This display will educate nearly 100,000 yearly visitors to the Aquarium. With a new curriculum and questionnaires for different age levels, the display will also become a destination for visiting school groups and link our existing native plant and animal displays.

Prior to beginning the display, an outside, elevated walkway would need to be completed. Our partner, the City of Clearwater, helped fund both the walkway and the connecting display. This component is still under construction and in the blueprint stage, but will eventually link with our indoor mangrove display and 55,000-gallon Taylor Hall Aquarium showcasing native species. We estimate another year for completion of this component. A new series of presentations are in design, along with a new curriculum that will be available on CMA's web site. Questionnaires were designed and targeted both the new presentation and curriculum. As an added bonus, our volunteer Information Technology team posted a 'test' page on CMA's web site. Visitors logging on can test their knowledge of exotics, native vegetation, and the information on the web pages, resulting in our having another method to evaluate the effectiveness of the posted information. As an aside to this, the Convention and Visitors Bureau has approved a grant allowing CMA to develop a new educational brochure showcasing our native wildlife and plant species.

The final component, the largest effort in the project, is directed toward the elimination of Brazilian peppers and other exotic vegetation on nearly 1100 acres of park, preserve, and private land bordering the preserve. Community volunteers, Aquarium staff and personnel from our partners will form Brazilian Pepper Assault Teams to remove the peppers using Garlon IV, the state recommended herbicide, and by physically cutting down the exotics. These same teams will be used to replant and monitor native vegetation in areas where the exotics have been removed.

We saw this as the base component of the grant. Only through the partnerships we forged would we have a chance to eliminate the Brazilian pepper trees at the 1100 acres of the five target sites. Early work at Honeymoon SRA had shrunk the acreage covered by the noxious trees, but the remaining stands were incredibly thick. At the wildlife preserve, the plants were so large and overgrown, that early expeditions and attempts at removal failed to notice the small stand (7 adult trees) of *Melaleuca* (*Melaleuca quinquenervia*) that had become established along one

shore of the small, brackish lake on the preserve. Additionally, we saw a need to remove the Air potato (*Dioscorea bulbifera*) from Sutherland Crossing, a privately owned timeshare selected as a target site because it adjoins the preserve. Because of our early work in the area, the local neighborhood association has joined our efforts by helping remove the introduced plants, replanting native vegetation, and removing litter. Additionally, a local business has gotten involved by purchasing five 'no littering' signs and having the county erect them along the road adjoining the preserve. It was a goal to involve local groups in our efforts, and we hope their involvement will continue the project into the future by helping to monitor the success of the new plantings. The other two target areas lie within the City of Dunedin. Weekly visits by our staff teamed with city park workers have benefited both partners by increasing the effort at the target sites. The City of Dunedin has begun removal of the snags and dead peppers at Hammock Park, providing both a chipper and crew.

### **Progress to Date**

Prior to beginning any component, we had to form a component 'team' to lay the groundwork for the stated objectives. We met with each team starting with the MLA 2-day Adventure team on June 20, 2000. Most team meetings were on a voluntary basis, as the start date for the grant was July 1, 2000. We met early however, as the window of opportunity for eliminating Brazilian pepper (BP) trees using Garlon IV is most effective during the summer months when the trees are without berries. Garlon IV use at other times of the year is still an effective method of treatment, but if the trees contain berries, they will drop and sprout, resulting in a larger problem the following year.

In order to monitor the progress and success of the removal and planting, an environmental monitoring program was developed. There was some baseline data on water quality and wildlife before the start of the project, as the MLA program has been doing biological assessments for three years prior. Our problem was that the data was not specifically targeted to the area, but instead covered an area extending away from the target sites in all directions. We decided since our target sites lay within the area and watersheds bounded by our previous assessments, we could use previously collected data to form the baseline. For added quality control, we also incorporated the temperature data collected by the Department of Environmental Protection and the City of Clearwater. A CMA staff biologist visits each target site weekly taking water samples for analysis. We also track temperature, pH, and salinity using 'off the shelf' kits. To monitor turbidity and light attenuation changes, a Licor 1400 datalogger and two spherical quantum sensors were purchased. Light readings in the air and water are taken simultaneously. By comparing the difference in the readings, we are able to determine the amount of attenuation (due to absorption and scattering) in the water column.

Linda Taylor, a local guide, has been doing bird walks in three of our target areas for several years. Her company, It's Our Nature, is the concessionaire for guide services within Honeymoon island SRA. This is another example of how a non-traditional partnership can flourish. Utilizing her help, knowledge, and data, we were able to get weekly bird counts to form a baseline for species present before restoration work began. She has benefited by using our data and knowledge to help her business grow. An earlier project in Sarasota County demonstrated a

marked increase in the numbers and species of birds in an area where Brazilian peppers were eradicated. We hope to show a similar increase in wildlife and native bird species with our restoration efforts.

## CONCLUSION

Unfortunately, the Tampa Bay region is in the grip of a multi-year drought, having received an average of 9-12" less than normal rainfall. This has delayed planting in all areas except where alternate sources of water were readily available. Only a series of storms (such as a *minor* hurricane) restoring our normal pattern of rains can ensure the long-term survival of plantings, especially in the more remote areas. On Arbor Day (April 27, 2001), we completed our first major planting of mangroves, sea grape, and various ground cover plants. These will be watered weekly until our normal pattern of summer rains start. Also, on April 13, 2001, we removed our pepper assault teams from Honeymoon island SRA, as it has been determined that the Brazilian pepper exotics have been eliminated from that site.

One of the unforeseen benefits of this project has been the enrichment of our web site. We normally average about 2500-3000 hits/day, and now because of the test and other enhancements, we will be able to more closely track access to the plant information. We have seen an increase in the number of requests for presentations to local community groups and organizations. This increased awareness should have direct benefits by increasing stewardship of the environment, especially in non-traditional sectors of the community.

It is our hope that projects such as these can be adapted to other communities not only here in Florida, but also in other parts of the United States and around the world. It will be through forming non-traditional yet dynamic partnerships such as ours, that communities can work together building a sense of stewardship, eliminating exotic vegetation, and conserving many diverse and important natural habitats.