



# Bahía de Jobos



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## *Impact of Hurricane Georges on the Mangrove Fern Acrostichum danaeifolium*

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In January of 1998, all of the leaves on 42 individuals of the mangrove fern *Acrostichum danaeifolium* were tagged and measured at four different sites at the Jobos Bay National Estuarine Research Reserve in Puerto Rico. Two of the sites were within a relatively undisturbed mangrove forest and the other two were in an area recovering from severe hydrologic stress. Plant and leaf mortality were noted in May of 1998 and new leaves tagged and measured. A scheduled monitoring trip on 21 September 1998 had to be canceled because the planned date coincided with the passage of Hurricane Georges, making the visit logistically impossible. In January of 1999 all four sites were again canvassed to record post-hurricane plant and leaf growth characteristics.

Hurricane disturbance was severe at the interior mangrove forest site (Forest 1), but not at the second forest site located at the edge away from the bay (Forest 2). At the severely impacted site it was estimated that 90% of the mangrove canopy was gone and at least 10% of the palms had fallen. The landscape was so changed that it was impossible to find 10 of the 12 tagged plants, though there appeared to be little obvious damage to *Acrostichum* individuals in the area. However, all 10 plants were relocated at the edge forest site. At the two stressed sites, only 6 of the 20 originally tagged plants remained. Four had died prior to the May monitoring

visit and the additional 10 had died or been washed away during the hurricane. In all, only 18 of the original 42 marked individuals were found alive in January of 1999.

Four measures of plant and leaf growth were examined to assess the effects of the hurricane: sterile leaf length, number of pairs of leaflets per sterile leaf, total leaf count per plant and annual leaf production rates per plant. The most striking change took place in the leaf length. The length of the most recently matured sterile leaf significantly decreased with leaves in January 1999 only 57% as long as those present on the same plants in January 1998. Three of the four sites showed large decreases in the length of leaves that emerged after Hurricane Georges (Figure 1). There were significant post-hurricane declines in the leaflet pair count and number of leaves per plant as well.

The annual leaf production rate was double that seen in any of the species of ferns which have been studied in the Luquillo rainforest. The annual rate before the hurricane (10.3 leaves per plant) though slightly higher, did not change significantly after the hurricane (9.3 leaves per plant). It is possible that leaves had formed within the shoot apex prior to the passage of the hurricane and emerged on schedule, though they were significantly smaller. If the hurricane did affect the primordial development of new leaves, the effects may not be seen until they emerge later in 1999. Fertile leaves are produced much less frequently than sterile leaves. The low rate of spore production in this fern seemed unaffected by the hurricane.

This study will continue for two more years. All lost and dead plants have been replaced with new study individuals and the effects of recovery from both hurricane and hydrologic disturbance will now be tracked.

*figure 1. The length of sterile leaves produced by individuals of the mangrove fern Acrostichum danaeifolium was much lower at three of the four sites at Jobos Bay where fern growth is being monitored. These measurements were taken on the same plants in January 1998 (pre-hurricane) and January 1999 (post hurricane). (see Spanish version)*

## Summer Programs

Our Education, Volunteer and Community Programs invite you to participate in the following workshops:

- Training for New Volunteers  
Sunday, June 27, 1999  
9:00 a.m., Visitors Center
- Summer Camp for "Estuarianos"  
June 12<sup>th</sup> to the 16<sup>th</sup> at the Visitors Center  
" Estuarianos" make the decision and confirm your participation.

Education Program is coordinating the following Workshops for this summer. All of them will have a duration of one day from 8:00 a.m. to 3:00 p.m. They are completely free of charge. For more information please call Dr. Clara Mojica at 853-4617 or 853-3569.

- Ecotourism Workshop: *JBNER: Its Potential as Environmental Interpretative Center*  
Audience: Tourist Guides, field trip , community leaders, hotel owners, general public.
- Workshop: *Activities Permitted in Area near the Maritime Zone and Wetlands*  
Audience: Local and State Government Representatives, Planners, Developers, Permit Evaluation Technicians, Consultants, Lawyers, Enforcement Personnel, General Public.
- Workshop: *Management Practices and Compatible Uses with Coastal Resources and Estuaries*  
Audience: Farmers, Developers, Industries, Planners, General Public.

JBNER Research Program will offer the following workshops for university students and laboratory technicians. If you are interested in participating contact Dr. Pedro Robles at 853-4617 or 853-3569.

- Workshop: *Use of submersible sensors to collect*

*water quality data.*

Management and calibration of YSI sensors for the recollection of pH, salinity, temperature, turbidity, conductivity, and dissolved oxygen in water will be discussed.

Capacity: 6 persons

Duration: 2 days; June 10 and 11; July 8 and 9

- Workshop: *Security in a Laboratory*  
Laboratory procedures in terms of management of reactive, disposition of wastes, security rules and first aids will be included.  
Capacity: 10 persons  
Duration: 1 day, June 7; July 5
- Workshop: *Use of GPS in Research Projects*  
Application and management of Geographic Positioning Systems (GPS) in the development of research projects will be discussed.  
Capacity: 6 persons  
Duration: 1 day, June 14; July 12

We would like to remind you that the Visitors Center is open during the weekends from 9:00 a.m. to 3:00 p.m. Drop by this summer and enjoy the exhibits on Aguirre's history and natural resources found in Bahía de Jobos. Come and learn about the Reserve!

## " Estuarianos"

Jobos Bay youth stewardship group " Estuarianos " have had the opportunity to broaden their knowledge on geographic positioning and map manipulation. As counterpart they have learned the utility and management of a compass to follow defined routes in the field. These activities allow them to take full conscience of a planetary citizenship that request a responsibility with our environment. In tune with the recent celebrations of Week of the Planet and Education Week, the "Estuarianos" Program offers the opportunity to encourage the so needed environmental education today. Congratulations to all the participants and most specially to the Teachers and Educators that are committed with the environment.

