Conservation of Coupled Human-Mangrove Systems

Research, Teaching, & Capacity Building on the Costa Alegre, Mexico

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Introduction

Approximately 1 billion people lack safe drinking water and approximately 2.6 billion people lack basic sanitation. These people live in relatively poor regions that lack the political institutions and financial resources necessary to develop the water supply infrastructure necessary to support both human and natural environments. Many of the remaining people have safe drinking water and basic sanitation only at the expense of water-dependent ecosystems in the natural environment. This is often due to a lack of political will-power to control growth that may be associated with a lack of education or refusal to consider the consequences of consuming the water that is required for ecosystem sustainability.

Costa Alegre

Translated as "Happy Coast", the Southwest Pacific Coast of Mexico is a region that now lies at a crossroads where informed decisions about development can be fostered and implemented, conserving these water dependent ecosystems while allowing economic growth.



La Manzanilla

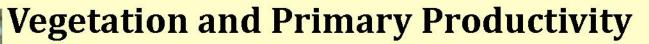
A small fishing village nestled in Tenacatita Bay faces adversity. With a population of about 1,200 residents, the population doubles when sea-



sonal residents and tourists visit during the dry winter and spring. This influx of people stresses the hydrologic resources through groundwater withdrawal and wastewater disposal while the resources are already naturally stressed via the dry season. This translates to saltwater intrusion being a real threat to the groundwater resources. To further exacerbate the issue, two of the four groundwater wells in town are owned by a neighboring five-star resort and golf course, El Tamarindo.

Interdisciplinary Research

Five modules allow an interdisciplinary approach to understanding the relationships between ecosystem and water resources. Each module is student driven by individuals from a variety of scientific academic backgrounds.



 Quantify mangrove species composition & net primary productivity

 Quantify the effects of hydrology on mangrove species composition & net primary productivity

Water Quality and Food Web

 Quantify nutrient concentrations & invertebrate community structure Model energy flow through the food web, from fixed carbon to fish

Fisheries

 Conduct baseline surveys of mangrove, reef and bay ecosystems to quantify fish community structure

 Identify key indicator species and monitoring protocol

Birds

 Conduct baseline surveys of the mangrove ecosystem to quantify resident & migratory bird community structure

•Identify key indicator species and monitoring protocol

Hydrology

 Quantify water sources and hydrodynamics in the mangrove ecosystem Develop a basin-scale numerical model to generate hypotheses regarding potential future conditions

Solutions Based Approach

Our group consists of principal investigators, student researchers, Earthwatch volunteers and the local community.











Field Based Teaching



This research project is entirely run as a field course by considering all student participants as fully-engaged student researchers. The field experience is composed of field discussion, lecture, data acquisition, presentation and sharing,

student-student team interactions and gives

the students researchers flexibility to create new research avenues or reshape the modules. Nearly 100 students have joined or will soon join our program in 2007 and 2008 alone.



Capacity Building

Although the program seeks to understand the relationships within human-mangrove systems, one of the primary goals is to educate local key resource mangers and others through local town hall meetings, community outreach, working with the local school, and giving pres-



entations at the local

university, Universidad de Guadalajara. By educating those living in La Manzanilla, those in charge of water resources and the local government, we seek to preserve and protect the mangrove from unintentional harm while ensuring local economic success.

Funding

Earthwatch Institute, USF Office of Undergraduate Research, Florida Section of the American Water Resources Association, and student fees.