



# CLIMATE CHANGE

## ENABLING ADAPTATION WITHIN THE MESOAMERICAN REEF

### OVERVIEW

The Mesoamerican Reef (MAR) system stretches over nearly 1,000 kilometers of coastline, spanning the Caribbean coasts of Mexico, Belize, Guatemala and Honduras. It is one of the largest in the Western Hemisphere and has been granted international recognition due to its unique and important variety of productive ecosystems. Human populations within each of its adjoining countries rely heavily on its diverse resources for much of their livelihood and sustenance.

### OBJECTIVES

#### General

Enhance the viability and health of the Mesoamerican Reef's diverse ecosystems that support the livelihoods and natural disaster protection of coastal communities through the consideration and incorporation of potential and actual impacts of climate change into ongoing marine and coastal resource management practices.

### MAIN RESULTS

#### Increased Scientific and Technical Capacity to Monitor Reef Health within the MAR.

Through collaboration with The Nature Conservancy (TNC), a number of individuals representing various local organizations (Governmental, NGOs, and Community Based Organizations) within the region were technically trained in rapid reef assessment techniques in 2006. These individuals are now able to design their respective monitoring programs to answer important management questions and effectively contribute to management efforts within the region.



#### Comprehensive Assessment of Reefs within the MAR.

WWF in partnership with various local organizations (including community based ones) carried out a detailed rapid reef assessment in Belize during 2006. This effort was replicated in Mexico, Guatemala and Honduras through WWF's collaboration with The Nature Conservancy (TNC). More than 400 sites within the MAR were investigated of which 327 sites had suitable reef substrate cover that warranted thorough investigation. Of the 327 reef sites, 140 were in Belize. These sites were randomly selected and included various reef morpho-types (shallow fore reefs, patch reefs and back reefs/reef flats). Based on this assessment, live coral cover was found to be overall low within the region; a national average of 11.3% for Belize, 7.64% for Mexico, 8.5% for Guatemala and 11% for Honduras. A critical finding for Belize also is that fore reefs appear to be more susceptible to bleaching than reef flat and patch reef sites, which is contrary to the current school of thought<sup>1</sup>.

This initiative is the first for the region in terms of spatial magnitude and offers the opportunity to provide more informed inputs in terms of reef conservation. WWF plans on continuing to track reef health and use the monitoring and research efforts to aid identification of bleaching resilient and resistant reefs.



#### Conducted Spatial Analysis, Mapping and Development of Geographic Information System Database of Reef Health Data to Aid Exploration of Climate Change Adaptation Strategies for Reefs.

Data from the comprehensive reef study was used to conduct an analysis of habitat representation for Belize and to aid in identification of bleaching resistant and resilient reefs. GIS applications were used to generate maps to spatially highlight healthier reef types (i.e. reefs likely exhibiting bleaching resistant and resilient potential) as well as their physical location with respect to the current MPA network. This information is being utilized to contribute to a critical decision support systems for conservation/management of the coral reefs.

<sup>1</sup> Prior to recent findings by members of the reef science community, fore reefs were thought to be less susceptible to bleaching effects – possibly due to higher flushing rates. However, even with the potential for higher flushing, bleaching is more intense due to more transparent overlying waters that allow for greater light penetration. Near-shore reefs (e.g. patch reefs), on the other hand, are overlaid by turbid waters that functions to buffer against intense light penetration.

#### NEED TO INCLUDE A MAP OF THE MAR!!

The health and integrity of the MAR, however, is under significant threat. Threats include declining or depleted fisheries stocks, habitat degradation or loss, declining water quality, among others. It is also subjected to increasing threat from global climate change, with more frequent coral bleaching events and potentially more frequent and violent storms projected. It has already been considerably impacted by the 1995 and 1998 mass bleaching events and hurricanes have had devastating ecological, economic and human-health related impacts in the region. Climate change could be the last straw that

pushes many reefs and other coastal systems beyond the threshold of recovery, yet efforts to critically address this threat is lacking. Tourism and fisheries, two of the region's main economic foundations for the population, depend on maintaining the health of reef ecosystems that are directly threatened by climate change impacts. Climate change (CC) is certainly the key global environmental issue of the day as it has substantial implications for development in the MAR region. Developing climate change adaptation strategies to improve resilience to this and other combined anthropogenic threats is crucial for helping the region weather the effects of climate change.

#### NEED TO INCLUDE A NICE PICTURE OF THE REEF AND MANGROVE!!

Through this project, World Wildlife Fund (WWF) is helping to provide the necessary guidance to create strategies to build ecosystem and human resilience in response to climate change. The project focuses on (a) assessing the impacts of CC on coral reefs and associated habitats & species, (b) working with partners to identify the most resilient reefs for further protection, (c) raising awareness of key stakeholders and the broader public on CC issues and possible adaptation strategies and (d) working with coastal communities to identify local based CC adaptation measures.

#### Specific

- Assess reef ecosystem health, predict climate change impacts to such systems and identify adaptation strategies to reduce impacts for decision support.
- Increase public awareness on climate change issues.
- Foster necessary networks for advocating, identification, and implementation of mitigation and adaptation strategies to build ecosystem and coastal community resilience to climate change.

"Storms in general, such as big 'southwesters' and 'northers' have changed a lot."

"I have definitely noticed a decrease in live coral during the time I was a skin diver fisherman."

"I think the climate is changing a lot. Some months have gotten hotter than they used to be. March, April and May used to be cooler and now they are hot."



Sydney Lopez  
Fisherman & Tour Guide  
Placencia Village

Pablo Kumal,  
Ex-Fisherman  
San Pedro Ambergris Caye

Teresita Alizola  
Fisherman  
Placencia Village

#### Building of Social Networks to Aid Identification of Key Consideration for Adaptation.

In order to foster climate change adaptation at the community level, WWF has been actively trying to strengthen the voices of communities and individuals to build social networks for adaptation. A Climate Witness Program was developed to collect information on peoples' perception about climate change and the ecological and socioeconomic implications of both climate change and anthropogenic (human-induced) stress factors. The project has successfully recruited Climate Witnesses from within the four MAR countries. Informants have all witnessed climate change in one form or another, including rising temperatures, altered precipitation and wind patterns, and coral bleaching.

Some of the perceptions from local communities center on coral bleaching and reef degradation, which are viewed as major issues for dependent livelihoods and industries (i.e. fishing and tourism). Most climate witnesses believe that responsible fisheries management and sustainable development activities are necessary to reduce the stress on coral reefs and associated species. On land, development is seen as a major issue, causing significant decreases in coastal mangrove coverage, which will increase vulnerability to storms and hurricanes; since coastal mangroves function as the second-line buffer next to reefs, WWF is actively working with these Climate Witnesses to help bring their issues and concerns to decision-makers.

#### Addressing Climate Change at the Community Level.

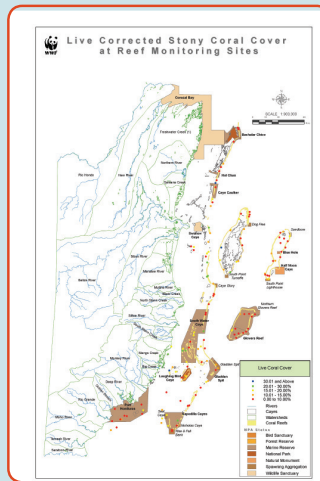
WWF is currently trying to focus more closely on community vulnerability assessment and community empowerment to identify functional adaptation strategies. The aim essentially is to obtain a more in-depth understanding of the vulnerability of these communities to climate change impacts. How has it impacted them in the past and what might it mean for them in the future. With an understanding of this, we will be in a better position to explore with them the aspects of their livelihoods (social, cultural, economic, institutional, etc.) that have helped them cope in the past, or have hindered them from coping in the past. And consequently, what they feel they may need to do in the future to be better prepared and more resilient or resistant to climate change. WWF is currently in the planning stage of gathering possible "solutions" – adaptation measures, from 5 targeted coastal communities within the MAR to produce a synthesis of these. While this is very useful – especially for decision-makers at a national/regional level, it is also important to capture – in the words of each community – their solutions, as this is something that could form the basis of community adaptation planning.



WWF feels that the starting point to understanding vulnerability and possible adaptation to CC is to fully understand the communities' interaction with the reef and coast. How they use it, what it means for their livelihoods, etc. At the same time, WWF is also building partnerships with regulatory and policy agencies, and other relevant groups working on resource conservation and climate change issues in the region, including the Caribbean Community Climate Change Center that is carrying out CC adaptation planning for the wider Caribbean region.

#### Investigation of Socioeconomic Values and Predicted Socioeconomic Impact from Climate Change.

WWF has been actively working in collaboration with the World Resources Institute (WRI) to execute an economic valuation of coral reefs and mangroves goods and services to provide accurate estimates of the value of these ecosystems to the Belizean populace. The project strives to evaluate the economic value of coral reefs and mangroves under future scenarios of resource degradation or improvement resulting from economic changes or policy interventions. It is hoped that the project will contribute to improving coastal resource management by providing new, reliable information to key decision makers on the current value of goods and services associated with coral reefs, on losses likely to result from degradation, and on the long-term benefits of investment in coastal management. Information from such socio-economic studies will be synthesized with the ecological data to obtain a better understanding of the economics of coral reef degradation, with emphasis on the impacts of climate change.



#### Public Outreach and Building of Awareness on Climate Change.

WWF has hosted several workshops and public meetings to share information and discuss climate change adaptation possibilities with relevant groups, the media and the public at large. A climate change public awareness campaign was launched in Belize in June 2007 and Guatemala in 2008 to increase awareness of climate change threats and to highlight the critical need for the identification and implementation of coping mitigation and adaptation measures.



WWF has also sponsored a climate change awareness training workshop for conservationists, resource managers, decision-makers and community people from within the Mesoamerican region to foster the inclusion of climate change consideration into current and future resource conservation and management efforts.

A number of communication and outreach materials including brochures, comic strip, stickers, articles, a climate witness poster, and two 15 min documentaries that features our climate witnesses and local climate experts have been produced. Documentaries have been featured in our mobile campaigns as well as aired on national TV stations. Project staff have also made several guest TV appearances to share information on the project and to discuss climate change issues.

### SUMMARY

The project has come a far way in trying to balance the focus of climate change efforts on both biodiversity conservation and livelihoods sustenance, and have been quite successful in raising awareness and initiating actions from individuals and participatory groups. Efforts have been placed on both bottom-up and top-down adaptation planning to alleviate impacts from climate change.

It is recognized that climate change has the potential to exacerbate underlying environmental problems and increase current conflicts over access to increasingly scarce, shared and open-access natural resources, including reef resources. It is also realized that there is a critical need for effective governance over the use and exploitation of these resources. Wise resource use and sustainable development practices are in shortfall due to inadequate conservation and development planning. Technically sound conservation and development planning is critically required and must be factored into the mitigating and adapting climate change approach being explored. It is important that such planning efforts be carried out through a participatory approach with various groups (policy, decision-makers, regulatory, conservation/management, civil society and local communities). By this means, WWF and partners will be in a better position to explore climate proof economic measures in how to use and interact with the natural resources.

A key take-home message from the work thus far, is the importance of protecting and restoring mangroves not only to maintain the health of the reef system, but also to protect coastal habitats, and maintain vital nurseries for a variety of marine species. Storms and hurricanes have shown people that mangroves are a second line of defense (after reefs) to protect their own homes and properties from beach erosion, saline intrusion and physical devastation. We are stressing this point in our outreach work and CC is giving us a good additional argument to continue convincing coastal dwellers, developers and decision-makers about the importance of maintaining and restoring mangroves. We are even lobbying for at least 20% of these habitats to be formally included within the coastal and marine protected areas system in the MAR network, since these habitats in particular are very under-represented in the PA Network.

By promoting the protection and conservation of coral reefs and mangroves, the maintenance of these economies directly and indirectly dependent upon them (in particular fisheries and tourism) will be fostered. A significant portion of the MAR populace depends on these economies as a source of food or livelihood. Through our ecological monitoring and public outreach work, we have been effectively documenting and raising awareness on threats to these systems, which we hope will set the pace for a concerted movement to effect change in how we use and interact with our natural resources.