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## Case Study

# An evolving approach to climate-smart conservation in the Meso-American Reef, Belize

This case study outlines the evolution of WWF Guatemala/ Mesoamerica Meso-American Reef (MAR) programme in Belize. Projects, results and lessons are shared covering over a decade of innovation, working with people and nature to help protect and manage Belize's marine environment in a context of change.

### Background & Introduction

WWF Belize Field Office began integrating climate change adaptation into its programme in 2006. The programme demonstrates how climate adaptation can and is being successfully mainstreamed, how it drives innovation and delivers multiple benefits, including climate smart conservation. It has taken a collaborative, learning by doing approach to addressing climate change, which has been facilitated by courageous programme management and flexible funding over a sustained period of time.

The MAR Programme has evolved from addressing land-based sources of pollution to integrating sustainable development, natural resource management, conservation and climate adaptation across a spectrum of sectors and levels, from the local to national and from ridge to reef. It has applied concepts such as natural capital to value ecosystem services<sup>i</sup> and has used this in conjunction with vulnerability assessments and scenario planning to develop cost effective adaptation responses. These in turn have been effectively linked into local and national planning and policy opportunities, influencing for example, the development of Belize's National Integrated Coastal Zone Management Plan and revisions of the National (Forest Act) Mangrove Regulations.

The Programme includes some thirteen interconnected initiatives and partnerships, which marry together under four linked pathways of work:

**Pathway 1)** Raising the awareness and agency of communities, civil society groups and public and private sector actors concerning climate change impacts.

*Project/initiatives: A climate change awareness campaign; vulnerability assessments*

**Pathway 2)** Supporting research and innovation using natural and social science to understand and address climate change impacts.

*Project/initiatives: Reef monitoring; Coral nursery; Coral Watch, National mangrove mapping; Marine turtle conservation initiative; Integrated planning for climate change adaptation, development and environmental sustainability (research)*

**Pathway 3)** Integrating climate change into key policy frameworks

*Project/initiatives: Informing Belize's Integrated Coastal Zone Management Plan (ICZMP); Climate change adaptation pilot project*

**Pathway 4)** Mobilising partnerships and networks across civil society, public and private sector actors around a shared concern for climate change.

*Project/initiatives: The Peninsula 2020 Initiative: A Consensual Vision of the Future of the Placencia Peninsula; Mangrove Friendly Development Challenge; Collaboration with Belize Association of Private Protected Areas (BAPPA).*

The programme initiatives all use and value nature or natural capital and work with local people, business, government and other institutions. Collectively the elements of the programme reinforce each other and over time have delivered tangible results and built institutional capacity at all levels to address climate change and other impacts on the marine environment.

## Summary of MAR Programme Initiatives

**Reef monitoring** - working with local volunteers using a standardized reef assessment methodology with a scientific protocol to monitor change and determine resilience. *Example outcome:* A marine reserve and fish replenishment sites have been designated and extended based on the identification of 'resilient' reefs.

**Coral Watch** - Over 40 local volunteers and organisations recruited and trained in reef monitoring. *Example outcome:* 78 reef sites monitored with annual reports produced on bleaching, providing an early warning of changes to the reef and sensitising dive operators and fishers to the reef's fragility.

**Coral Nursery** – 9 coral nurseries in Southern Belize supported (Fragments of Hope Ltd. collaboration with WWF, the World Bank, the Caribbean Community Climate Change Centre (CCCCC) and the International Development bank (IDB) working with volunteers and local community). *Example outcome:* The nurseries have produced approximately 80,000 coral fragments, with corals planted in four marine protected areas (MPAs). New role for MPA identified as areas for coral propagation and restoration, growing on climate change resilient corals to build reef resilience.

**National mangrove mapping** – exercise carried out in partnership with the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) and the Environmental Research Institute University of Belize. *Example outcome:* The study has produced a cost effective

reliable baseline of the state of Belize's mangroves and provides decision makers with a visual representation of mangrove areas, of recent changes to mangroves and areas of vulnerability. It has informed the development of the National Coastal Zone Management Plan and mangrove regulations under the National Forest Act.

**Marine turtle conservation** – the 'Coral Watch' model is being used along with WWF's marine turtle toolkit to support marine turtle conservation. *Example outcome:* Biologists from Belize's 13 Marine Protected Areas and community members near known nesting sites have been trained in sea turtle biology, how to monitor beaches for signs of nesting, and in the impacts of climate change.

**A climate change awareness campaign** - meetings held in six coastal communities with support from the government's Meteorology Service, a WWF-produced documentary about climate change made for national TV, and an on-line social network to connect climate witnesses and other local voices. *Example outcome:* an informed conversation about climate change and the marine environment had begun.

**Vulnerability Assessments (VA's)** – carried out in coastal communities of Placencia, San Pedro and Port Loyola, taking account of climate and non-climate change threats to coastal and marine resources and how changes to marine resources might affect communities. *Example outcome:* climate change adaptation measures including restoration of mangroves and the designation of protected areas, including over 17,000 mangrove seedlings planted with Placencia community.

**The Peninsula 2020 Initiative: A Consensual Vision of the Future of the Placencia Peninsula** - this grew out of the 2007 VA. *Example outcome:* Local community is now planning proactively rather than responding to individual threats and has a stronger seat at the negotiation table. The threat of a cruise ship port has been postponed through Vision led community advocacy. The Vision and VA processes have contributed to the recognition of ecological, storm surge protection and tourism values.

**Integrated planning for climate change adaptation, development and environmental sustainability** - research project involving a series of participatory multi-stakeholder workshops. *Example outcome:* Thinking developed about collaborative, scenario based planning approaches amongst WWF Belize and its public and civil society partners.

**Mangrove Friendly Development Challenge** – annual outreach and event whereby private sector land owners are engaged, incentivised and informed about importance of mangroves. *Example outcome:* a website showcasing past winners and good practice booklet for prospective developers reinforce that mangrove conservation can be compatible with good coastal development, with past winners becoming strong advocates for mangrove protection.

**Collaboration with Belize Association of Private Protected Areas (BAPPA)** -supporting developers to conserve and manage mangroves. *Example outcome:* Several large tourism developments in Placencia have set aside 10% - 60% of their properties as mangrove reserves.

**Informing Belize's Integrated Coastal Zone Management Plan (ICZMP)** – WWF and the WWF partnership 'Natural Capital Project' (NatCap) worked closely with CZMAI in developing Belize's first national ICZMP. *Example outcome:* The plan explicitly addresses the valuation of nature's benefits to people, it considers climate change impacts, incorporates local stakeholder concerns and interests, and designates the use of specific areas of the coast e.g. MPAs, aquaculture, tourism, etc. The ICZM Plan was recently adopted by the Government of Belize.

**Climate change adaptation pilot project** – filling a gap in current planning, this pilot brought together regional experts and local people to assess the economic value of ecosystem services, the implementation and management costs of various adaptation options, and climate related damages under three climate adaptation scenarios. *Example outcome:* Evaluation of alternative climate adaptation strategies for the Placencia region using a cost-benefit analysis that incorporates change in ecosystem service values.

Date	Initiative / Activity	Key outcomes
2002	A Belizean marine biologist noticed broken fragments of corals that were still living and growing and began exploring the idea of using these coral fragments to restore damaged reefs.	WWF Belize was an early supporter of this idea, recognising its potential to contribute to the resilience of the reef by protecting corals that appeared to be resilient to coral bleaching.
2004	WWF MAR programme initiated, protecting marine environment from land-based drivers of change, especially those caused by unsustainable agricultural practices	
2006	WWF began to integrate climate change adaptation into its programme.	
	Rapid reef 'resilience' assessment carried out at 140 randomly selected sites in Belize and 186 reef sites across Mexico, Guatemala and Honduras.	In Belize, only 3 of 140 reef sites ranked 'good' in terms of resilience and the majority were considered to be 'poor' or 'fair'.
	WWF supported the standardization of the reef assessment methodology, developing a scientific protocol to monitor changes.	Fish replenishment sites within the Caye Caulker Marine Protected Area (MPA) expanded to include two resilient reef sites Turneffe Atoll Marine Reserve designated as a marine reserve (October 2013), including three resilient reef sites.
	BNCRMN established a system for the on-going monitoring of the reef using volunteers.	
2007	WWF Belize implemented an awareness raising campaign focused on how climate change will, and already was, affecting people's lives.	Six coastal communities had meetings with support from the government's Meteorology Service. A WWF-produced documentary about climate change (which was still being shown on local Belize TV stations six years later!) An informed conversation about climate change and the marine environment began.
	WWF Belize created an on-line social network to connect climate witnesses and other local voices.	
2008	The Coral Watch project found and trained local volunteers to monitor and provide an early warning of changes to the reef.	Over 40 volunteers and organisations recruited and trained in reef monitoring. New climate change champions fostered. Since 2008, the Network has monitored 78 reef sites and produced annual reports on bleaching. The programme also sensitises dive operators and fishers to the fragility of the reef.

	<p>The first vulnerability assessments (VA's) were carried out, taking account of climate and non-climate change threats to coastal and marine resources and how changes to marine resources might affect communities.</p>	<p>VA's in coastal communities of Placencia, San Pedro and Port Loyola. Communities' proposed climate change adaptation measures including restoration of mangroves and the designation of protected areas. VA's influenced and informed both local and national planning processes.</p>
<p><b>2009</b></p>	<p>WWF became the key financial supporter of the BNCRMN network when other funding failed.</p> <p>Projects undertaken to reduce vulnerability (identified by VA's) including mangrove restoration.</p> <p>The Mangrove Friendly Development Challenge established.</p> <p>WWF began working with the Belize Association of Private Protected Areas (BAPPA), which supports private landowners to register their conservation holdings</p> <p>WWF, the World Bank and the Caribbean Community Climate Change Centre (CCCCC) were working in partnership with Fragments of Hope Ltd. to support local 'coral nursery' initiative.</p> <p>WWF provided additional funding to support the genetic profiling and monitoring of out-planted corals.</p>	<p>Over 17,000 mangrove seedlings planted with Placencia community, including school children.</p> <p>Private sector land owners engaged and incentivised and informed about importance of mangroves. Outreach, the event, a website showcasing past winners and good practice booklet for prospective developers reinforce that mangrove conservation can be compatible with good coastal development. Past winners have become strong advocates for mangrove protection.</p> <p>Supporting developers to conserve and manage mangroves. In Placencia many large tourism developments have set aside between 10% and 60% of their properties as mangrove reserves.</p> <p>9 coral nurseries in Southern Belize. The nurseries have produced approximately 4000 coral fragments comprising the main reef building corals in the Caribbean.</p> <p>Corals have been planted in Gladden, Hol Chan, Laughing Bird Caye and Turneffe marine protected areas.</p> <p>New role for MPA identified, as areas for coral propagation / restoration, growing on climate change resilient corals to build resilience of the reef. WWF sponsored genetic tests that revealed 17 distinct genotypes in the nurseries.</p>
<p><b>2010</b></p>	<p>Research programme on integrated planning for climate change adaptation, development and environmental sustainability. The Peninsula 2020 Initiative: A Consensual Vision of the</p>	<p>Community and volunteer support has been a large part of the project. The research developed thinking about collaborative, scenario based planning approaches amongst WWF Belize and its public and civil society partners.</p> <p>Community now planning proactively rather than responding to individual</p>

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Future of the Placencia Peninsula (grew out of the 2007 vulnerability assessment)

threats.  
Threat of a cruise ship port postponed through Vision led community advocacy.  
Community has stronger seat at the negotiation table.  
The Vision and VA processes have contributed to the recognition of ecological, storm surge protection, and tourism values of Placencia, Efforts underway to create a protected area for the lagoon.

WWF Belize initiated a national mangrove mapping exercise, partnering with the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) and the Environmental Research Institute University of Belize.

The study produced a cost effective reliable baseline of the state of Belize's mangroves.  
Decision makers have a visual representation of mangrove areas, recent changes to mangroves and areas of vulnerability.  
Overall mangrove loss of about 2% over 30 years shown, revealing patterns of fragmentation and significant loss in areas where communities had raised concerns about their vulnerability to storm surges i.e. San Pedro and Placencia.  
Study has informed the development of the National Coastal Zone Management Plan and mangrove regulations under the National Forest Act.  
Protection of areas with large standing mangroves and good connectivity are being prioritized, e.g. around Placencia Lagoon.

**2011**

'Coral Watch' model used with WWF's marine turtle toolkit to support marine turtle conservation.

The local civil society partner, ECOMAR, runs workshops for communities on turtle friendly activities such as reducing lighting on beaches.

WWF plays key role in Belize's National Integrated Coastal Zone Management Plan.

Biologists from Belize's 13 Marine Protected Areas and community members near known nesting sites were trained in sea turtle biology and how to monitor beaches for signs of nesting, and in the impacts of climate change.

An Integrated Coastal Zone Management Plan (2012) designed by CZMAI with WWF and NatCap expert input, based explicitly on the valuation of nature's benefits to people. The plan considers climate change impacts, designates the use of specific areas of the coast e.g. MPAs, aquaculture, tourism, etc. and incorporates local stakeholder concerns and interests.

Climate change adaptation pilot project

The economic value of ecosystem services, the implementation and maintenance costs of various adaption options, and climate related damages were assessed under three climate adaptation scenarios

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A regional workshop validated climate change scenarios and identified possible adaptation options. Evaluation of alternative climate adaptation strategies for the Placencia region using a cost-benefit analysis that incorporates change in ecosystem service values.

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## Successes

Three major overarching successes can be summarized:

1) **Social mobilization:** educating, empowering and mobilizing a variety of different stakeholders (including communities, land owners and managers, private sector, and government) to act or contribute to safeguarding Belize's natural capital at local and national levels.

2) **Fostering long term change within and beyond the target social-ecological system:** contributing WWF's expertise and partnership capacity (e.g. NatCap) to influence national level policy has helped deliver impact at scale, notably a forward thinking national ICZM Plan that takes account of climate change and can serve as a blue-print for how to balance conservation with current and future development needs.

3) **Building resilience:** enhancing the capacity of local people and natural systems to cope with and recover from change, particularly climate change related impacts. Vulnerability assessments, community threat hazard mapping and their follow up have helped build adaptive capacity and resilience in local communities and coral nurseries propagating bleaching resilient corals are helping to build reef resilience, including within Marine Protected Areas.

## Lessons learned

Valuable lessons have also been learned throughout the Programme's evolution, including:

- The importance of good partnerships and building trust, which have enabled the programme to leverage impact at scale
- The ability of robust vulnerability assessments and visioning processes to deepen community understanding and capacity, which seems to have played a critical role in community empowerment.
- Long term investment is lacking and needed for scientific research and data storage to measure impacts on ecosystems and local communities and to show and evidence change.
- Integrating climate adaptation planning into an existing conservation programme has enabled multiple drivers of environmental change and their interactions to be addressed in innovative ways, whilst building long term capacity and resilience to cope with change.
- Organisational constancy (such as a long term programme manager), along with good local connections, respect, trust and the ability to adapt, recognise opportunities and embrace innovation are all vital qualities for working successfully with multiple partners and strategies.
- Being flexible and opportunistic has helped generate and sustain momentum around the new and emerging agenda of climate change adaptation.

These and other lessons are detailed in a more detailed case study and it is hoped that they and the case study itself will help inform future work of WWF and others, including prospective funders, to support and deliver climate-smart conservation for people and nature.

## Authors

This case study has been written by Nadia Bood, Marianne Fish, and Jo Phillips.

## Contributors

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<sup>i</sup> The MAR provides vital services to Belize – mangroves provide sheltered fish nurseries; mangroves and reefs provide rich fishing grounds; and, reefs, mangroves and other forest ecosystems protect coastal communities from storm surges. The combined value of the reef and mangrove ecosystems to the economy of Belize has been estimated at between US\$395 - \$559 million per year (Cooper et al. (2009) *Coastal Capital: Belize. The Economic Contribution of Belize's Coral Reefs and Mangroves*. WRI Working Paper. World Resources Institute, Washington DC. 53 pp. Available online at <http://www.wri.org/publications>)

