

Mesoamerican Reef Alliance
ICRAN-MAR Project

TERMINAL REPORT

Contact: Liza Agudelo, Project Coordinator
lagudelo@icran.org

September, 2007

UNITED NATIONS ENVIRONMENT PROGRAMME
Caribbean Regional Coordinating Unit

CARIBBEAN ENVIRONMENT PROGRAMME

TERMINAL REPORT

BACKGROUND INFORMATION.

Project Title: **Mesoamerican Coral Reef Alliance**

UNEP Project Number: **UNE-GLO-01-201J**

USAID Grant Number: **596-G-00-03-00215-00**

Responsible Office: **Regional Coordinating Unit**

Coordinating Agency/Supporting Organization: **United Nations Foundation**
U.S Agency for International Development

Project Starting Date: **July 2004**

Project Completion Date: **June 2007**

Total Budget (USD)
USAID and UNF contribution: **\$3,000,000.00USD**

Relevant UNEP Programme of Work Component Number: **MT/101-01-80 (UNE-GLO-01-201)**

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS.....	6
INTRODUCTION.....	8
EXECUTIVE SUMMARY	8
OVERALL PROJECT PERFORMANCE.....	8
PROJECT IMPLEMENTATION	9
MAJOR IMPACTS.....	14
COORDINATION AND MANAGEMENT – LESSONS LEARNED/RECOMMENDATIONS	15
THE WAY AHEAD – VALUE ADDED FROM THE ICRAN-MAR ALLIANCE	16
PROJECT STATISTICS – OVERALL INDICATORS.....	18
I. PROJECT DESCRIPTION AND OBJECTIVES	25
A. STRATEGIC OBJECTIVE AND INTERMEDIATE RESULTS	25
II. IMPLEMENTATION OF PROJECT COMPONENTS 2004-2007	26
A. IMPROVED WATERSHED MANAGEMENT (IR1).....	27
1. <i>Threats – Rationale for Component Design</i>	27
2. <i>Description of Component Strategy – Dynamics</i>	28
3. <i>Major Outputs/Results – Impacts in the Region</i>	29
Partnerships with agribusiness	29
A) Major outputs:	29
B) Scope of Results/Impacts – Relevance of Outputs to the Region.....	35
Watershed Analysis and modeling.....	37
A) Major outputs:	37
B) Scope of Results/Impacts – Relevance of Outputs to the Region.....	38
C) Capacity Building	40
D) Information Dissemination	41
4. <i>Impacts and the Larger Scale – Leveraged Support – The Way Ahead</i>	41
Partnerships with agribusiness	41
Watershed Analysis and modeling.....	43
5. <i>Lessons Learned and Recommendations</i>	46

Partnerships with agribusiness	46
Watershed Analysis and modeling.....	47
B. SUSTAINABLE FISHERIES (IR2).....	48
1. <i>Threats – Rationale for Component Design</i>	48
2. <i>Description of Component Strategy – Dynamics</i>	49
3. <i>Major Outputs/Results – Impacts in the Region</i>	53
A) Major outputs:	53
B) Scope of Results/Impacts – Relevance of Outputs to the Region.....	56
1) Best Fishing Practices – Community management and local participation	56
2) Ecological and socio-economic monitoring	58
3) Increased capacities for local community members to engage in alternative livelihoods.....	59
4. <i>Impacts and the Larger Scale – Leveraged Support – The Way Ahead</i>	60
5. <i>Lessons Learned and Recommendations</i>	62
C. SUSTAINABLE TOURISM (IR3)	64
1. <i>Threats – Rationale for Component Design</i>	64
2. <i>Description of Component Strategy – Dynamics</i>	64
3. <i>Major Outputs/Results – Impacts in the Region</i>	66
A) Major outputs:	66
B) Scope of Results/Impacts – Relevance of Outputs to the Region.....	67
4. <i>Leveraged Support, Impacts and the Larger Scale – The Potential Way Ahead</i>	71
5. <i>Lessons Learned and Recommendations</i>	73
III. PROJECT INDICATORS BY COMPONENT – FINAL STATUS.....	76
IV. TABLE OF ANNEXES	90

LIST OF TABLES AND FIGURES

<i>Table 1: Number of Institutions/Communities Involved Per Sector</i>	18
<i>Table 2: Leveraged Funds - over \$1,600,000 USD in support of activities under the three components</i>	18
<i>Table 3: Leveraged Impacts – originated from project objectives not contemplated in original project document</i>	20
<i>Table 4: Project Products used by other institutions – raising the profile of the ICRAN-MAR project</i>	20
<i>Table 5: Beneficiaries – over 1,000 direct beneficiaries through various activities in the 3 components</i>	21
<i>Table 6: MoUs signed with agricultural companies - BMPS.....</i>	29
<i>Table 7: Fisheries Component – Percentage of efforts invested by country – as of July 2007</i>	52
<i>Fig. 1. Type of Organizations Involved in the Project.....</i>	22
<i>Fig. 2. Sector Participation by Country.....</i>	22
<i>Fig. 3. Government Agencies Participation by Component.....</i>	23
<i>Fig. 4. Local NGOs Participation by Component.....</i>	23
<i>Fig. 5. Other NGOs/Regional Initiatives Participation by Component</i>	23
<i>Fig. 6. Local communities Participation by Component</i>	24
<i>Fig. 7. National Institutions Participation by Component.....</i>	24
<i>Fig. 8. Private Sector Participation by Component.....</i>	24

ACRONYMS AND ABBREVIATIONS

ACCPCA	Civil Association of Sugarcane Producers from the Río Hondo watershed, Chetumal Bay, Mexico
ACISON	Association of Citrus Producers from Sonaguera - Honduras
AGROTOR	Agropecuaria Tornabé, Honduras
APESCA	Asociación Pesquera del Caribe
AVHRR	Advanced Very High Resolution Radiometer
AZUNOSA	Azucarera del Norte, S.A., Honduras
BERDS	Biodiversity & Environmental Resource Data System of Belize clearinghouse
BMP	Better Management Practice
BFCA	Belize Fishermen Cooperative Association
BTIA	Belize Tourism Industry Association
CAFTA	Central America Free Trade Agreement
CCAD	Comisión Centroamericana de Ambiente y Desarrollo
CELB	The Center for Environmental Leadership in Business
CGA	Citrus Grower Association, Belize
CI	Conservation International
CIAT	Centro de Investigación Agrícola Tropical
CLUE-S	Conversion of Land Use and its Effects
CONANP	Comisión Nacional de Áreas Naturales Protegidas, México
CONAP	Consejo Nacional de Áreas Protegidas, Guatemala
CORAL	Coral Reef Alliance
CST	Certification for Sustainable Tourism
CTO	Caribbean Tourism Organisation
CZMAI	Coastal Zone Management Authority Institute, Belize
FAO	Food and Agriculture Organization of the United Nations
FGDC	Federal Geographic Data Committee
FHIA	Fundación Hondureña de Investigación Agrícola
G-CAP	Guatemala – Central American Programs Mission, USAID
GCRMN	Global Coral Reef Monitoring Network
GDA	Global Development Alliance (USAID)
GEF	Global Environment Facility
GEMS-GLORI	Global Registration of Land-Ocean River Inputs
ICRAN	International Coral Reef Action Network
ICRI	International Coral Reef Initiative
IGBP	International Geosphere / Biosphere Program
INEGI	Instituto Nacional de Estadística, Geografía e Informática, México
IWC	Integrated Weed Control
LOICZ	Land-Ocean Interactions in the Coastal Zone
MAR	Mesoamerican Reef
MBRS	Mesoamerican Barrier Reef System
MODIS	Moderate Resolution Imaging Spectroradiometer
MPA	Marine Protected Area
MSC	Marine Stewardship Council
N-SPECT	Non-point Source Pollution and Erosion Comparison Tool
OSPESCA	Organización del Sector Pesquero y Acuícola Del Istmo Centroamericano
PALSA	Palmas de San Alejo, Honduras
PEAS	Pesticide Environmental Assessment System
PROARCA	Programa Ambiental Regional Para Centroamérica (de USAID)
RA	Rainforest Alliance

RC	Reef Check
SOSC	Strategic Objective Steering Committee
SRTM	Shuttle Radar Topography Mission
TNC	The Nature Conservancy
TOC	Technical Oversight Committee
ULPCA-CNC	Local Union of Sugarcane Producers, Chetumal Bay, Mexico
UNEP	United Nations Environment Programme
UNEP-CAR/RCU	UNEP Caribbean Regional Coordinating Unit
UNEP/DTIE	UNEP Division of Technology, Industry, and Economics
UNEP-WCMC	UNEP-World Conservation Monitoring Centre
UNF	United Nations Foundation
USAID	United States Agency for International Development
WCS	Wildlife Conservation Society
WIDECAST	Wider Caribbean Sea Turtle Conservation Network
WRI	World Resources Institute
WMW	ICRAN-MAR Watershed Management Workshop
WWF	World Wildlife Fund

INTRODUCTION

The current report is submitted to UNEP to meet final reporting requirements as indicated in the Project Document UNE-GLO-01-201J¹ in support of the ICRAN Mesoamerican Reef Alliance (ICRAN-MAR),

Beginning with an executive summary that describes overall status of project components – including summarizing tables of project statistics and project indicators– the report moves on to describing detailed aspects of project implementation by component (refer to Section II); these sections contain lessons learned and expected results as of June 30, 2007. Section III presents the financial status of the project as of June 30, 2007. A final table of relevant Annexes is presented at the end of the document.

EXECUTIVE SUMMARY

In recognition of the ecological and socio-economic richness and importance of the Mesoamerican Barrier Reef region (MAR), the ICRAN Mesoamerican Reef Alliance (ICRAN-MAR) project was designed in 2003 to contribute to the many local, national and regional-level resource conservation and sustainable development projects that had been initiated in the MAR region since 1990. Discussions among ICRAN representatives and conservation leaders in the MAR region had established that there were opportunities where ICRAN could, and should, become engaged.

As a result, ICRAN partners developed a 3-year initiative to address threats to the MAR under three components known for their potential to strongly impact the coastal and marine ecosystems: watershed management, sustainable fishing, and sustainable tourism. With the generous support of the United States Agency for International Development (USAID) and the United Nations Foundation (UNF), the ICRAN-MAR partners would conduct a set of inter-linked, complementary activities to enable the proliferation of good practices for coral reef management and conservation. The strategy of this Alliance would combine a conservation and sustainable management approach with the creation of partnerships with the private sector to leverage resources and talents to find long-term solutions.

Project implementing partners are the World Resources Institute (WRI), UNEP-World Conservation Monitoring Centre (WCMC), World Wildlife Fund (WWF), The Coral Reef Alliance (CORAL), UNEP-Division of Technology Industry and Economics (DTIE), and Reef Check. After nearly 3 years of activities, implementing partners achieved significant results, exceeding original expectations in various instances. A lead organization within ICRAN, UNEP-CAR/RCU managed project execution and overall coordination.

OVERALL PROJECT PERFORMANCE

At the end of this 3-year period, ICRAN-MAR partners have delivered project results as expected and in some instances they have produced more than originally requested in their project documents. Over the course of these years, they managed to overcome difficulties encountered during the development of the project to be able to produce the required deliverables.

¹ MT/1010-01-80/8A/8B/8C/8D/8E

Some initial roadblocks included:

- Availability of tools to undertake their activities – not always ready or easy to find,
- Need for coordination with other partners in the region – not easy to coordinate or to get information from others,
- Difficulties in timely coordination with other component counterparts – each organization carries out other parallel activities and schedules not always coincided,
- Receptiveness of local institutions and their willingness to provide information – level of response from local partners or their capacity to become involved was different in every country,
- Lack of relevant/available information or data
- Insufficient project staff at any given time
- Budget constraints – original budget envisioned organization of one regional workshop; responses from regional stakeholders show that the project could have benefited from more resources for on-the-ground consultation and further capacity building.
- Overcoming confidentiality issues – such as in the case of agribusiness providing details about their industrial processes

Notwithstanding these and other challenges, the objectives of ICRAN MAR have clearly been met. Some of the early difficulties were linked to the very nature of the processes partners were to implement (e.g. signing MoUs with agribusiness which demands significant amount of time, or coordination with other regional initiatives). Others were related to shifts in staff responsibilities since times of project design and conception to actual implementation. In different instances program officers undertaking the planned activities found that it was difficult to carry out activities or to produce results as originally envisioned by their predecessors. Luckily, the adaptive management capacity of the project and the close communication with the coordination unit facilitated overcoming these hurdles and project results have been achieved.

The program has established and strengthened important alliances with partner organizations and projects (e.g. Conservation International, TNC and FFEM), major international corporations (e.g. Chiquita, Dole, Fyffes, etc.), local industries and local community groups (e.g. fishermen's cooperatives). This mosaic of partnerships and alliances has positioned the project at a strategic point where there is potential to leverage major changes in policies and practices at national and regional levels. These changes are needed to reduce threats from expanding development activities and overall economic growth in the region.

PROJECT IMPLEMENTATION

The project evolved since its original inceptions and over the course of the implementation phase. Earlier stages required significant investments to set up the necessary mechanisms to undertake planned activities and achieve project goals. This included, among others, gathering information and building relationships with local counterparts. Initial results provided a good platform not only to leverage further support from governments and the private sector but also to inform and influence decision makers in the region. During the implementation phase, ICRAN-MAR partners capitalized on lessons learned and strengthened channels of communication with project partners and other initiatives in the region.

While the three components of the project were closely interlinked and designed to pursue the overall goal of contributing to the sustainable management and use of the Mesoamerican Reef, each component had particular characteristics and different levels of complexity. The high dynamism of the project activities and the challenges they produced, called for adopting an

adaptive approach to allow addressing changes in the implementation mechanisms as appropriate. Under the supervision of the Project Coordinator and the guidance of UNEP-CAR/RCU this approach facilitated the reorientation of investments —consequent with the project’s objectives— as necessary.

The spirit of creating alliances and consolidating societies with the private sector for the benefit of coral reefs in the Mesoamerican region was the fundamental objective of the ICRAN-MAR Project. The positive results obtained by the project demonstrate that alliances are an effective mechanism that can bring great benefits for the handling of Marine resources. Nevertheless, coordinating efforts requires commitment and joint work to identify the best strategies that involves relevant stakeholders and especially the local partners.

Please refer to Section II of the present report for more detailed information.

Watershed Management

This component was integrated by two complementary sub-components:

- a) WWF focused its efforts identifying sources of pollution and sediment from agricultural activities that have a negative impact on the marine environment, as well as on-the-ground activities with agricultural businesses to adopt a suite of “better management practices”. This work was designed to be carried out in three years and produced concrete innovative results for the MAR region; activities will continue well beyond the life of the ICRAN-MAR project with leveraged support from various sources.
- b) WRI and UNEP-WCMC produced information and GIS tools for examining the potential impact of different land use and development options in the region and the associated impacts on water quality in the MAR. These hydrologic models and diagnostic tools help educate and encourage key stakeholders to implement better management practices to reduce impacts on the coastal and marine resources. This work was designed to be carried out during the first two years of the project; tools and results have been disseminated and some local institutions will continue follow up actions (further validation of models) beyond the life of the ICRAN-MAR project.

Under the leadership of WWF, the project produced significant results following an innovative approach that praised the importance of adopting better management practices (BMPs) in the agricultural sector, and highlighted the relevance of partnership building with the private sector for conservation efforts and better management. Aiming to achieve the project goal of identifying agricultural threats WWF managed to set up a bioaccumulation monitoring program, designed a monitoring protocol, and leveraged significant resources from the private sector (e.g. Croplife) and other donors in the region (e.g. Summit Foundation) that help consolidate project results in the long-term. MoUs signed with major agricultural companies in the region (e.g. Chiquita, Dole) are now promoting the implementation of BMPs and speak of the industry’s willingness to participate in actions that can lower their impact on the environment while maintaining their economical benefits.

This innovative work combining bioaccumulation testing with actual field work in promoting sound and cost effective better management practices allowed WWF to raise the profile of the ICRAN-MAR project in the region. The agriculture work done under the ICRAN-MAR project has created the basis for deploying BMPs with the potential to reduce pesticides use by commercial agriculture and therefore to reduce contamination threats to the MAR.

As a result of project activities, Dole, Chiquita, and AZUNOSA are implementing a Pesticide Environmental Assessment System (PEAS) to reduce pesticide exposure levels for the

environment and agriculture workers of Type I and II agrochemicals, which are the most toxic substances for humans and the environment. The execution of the Pesticide Environmental Assessment System (PEAS) is an important step in the standardization of measurements, control practices, and the reduction of the negative effects pesticides might have on either production or consumption.

Collaboration between WRI and WCMC provided the basis for an innovative and comprehensive watershed analysis for the Mesoamerican Reef released by WRI (data CD and analysis) providing significant insights on the connections between land-based sources of threat and impacts to the MAR. This hydrologic analysis tool works at many scales and allows identification and prioritization of the sub-basins which contribute the most sediment and nutrients to coastal waters along the MAR. This analysis provides region-wide results that *should be considered preliminary and indicative of the overall pattern and magnitude of erosion and nutrient and sediment delivery across the region.*

Results of this analysis show that relevant policy action at a national level to address the contributions from agricultural lands in the region need to be supported. There is great potential and interest in the region to use this tool and its preliminary results. Results have helped identify areas in need of better agricultural management, as the analysis identifies vulnerable areas where conversion to an erosive land use should be avoided, or where converted conservation practices should be implemented. The analysis also identifies areas with high erosion and nutrient runoff, where better agricultural management practices should be targeted. WWF has used the analysis results to target interventions on improved agricultural management.

Sustainable Fisheries

Early in the project, WWF carried out an analysis of the fisheries sector in the four MAR countries to determine needs and a protocol for action to successfully promote community-based fisheries management. Two main types of fishing were identified: 1) Lobster Fisheries, and 2) Finfish Fisheries.

After conducting field studies, several consultation workshops with experts in the region and local fishermen stakeholders, WWF was able to identify all the lobster fishing techniques in the MAR and to produce a comprehensive set of educational materials in support of Best Fishing Practices (BFPs) for lobster. A lobster Manual called “How to profit by practicing sustainable fishing: Lobster Fishing Practices Guidelines for the Mesoamerican Reef” was developed in coordination with local fishermen and guided fishermen to adopt better fishing techniques. All these activities set the basis to achieve more ambitious goals, such as lobster fishery certification, or the establishment of a monitoring system of BFP that allows fishermen to guarantee that their lobsters have been caught using BFP (some seafood buyers have expressed their interest in buying this lobster at a preferential price). APESCA in Honduras is using and promoting better fisheries practices with the environmental friendly trap for lobster.

Throughout the life of the project several local communities requested to participate in the initiative supporting the adoption of BFP and expressing their interest in engaging in sustainable and profitable alternative economic livelihoods. This is indicative of how much local communities become aware of the significance and potential of their contribution to maintaining healthy reef ecosystems.

To address finfish fisheries, an Ecosystem-based fisheries management (EBFM) – with fishermen participation in field data gathering – was selected as the strategy to bridge the link between community-based management and ecological monitoring. The EBFM establishes a series of protocols for the use, monitoring and evaluation of the ecosystems where fishing takes

place. This strategy aims to reverse environmental degradation, and to provide socioeconomic benefits associated with fishing, and to help project partners understand the effects of human activities on ecosystems. The protocols developed allowed partners to gather relevant scientific high quality information very useful in the designing of fisheries management.

The strategy to introduce the EBFM was to identify marine protected areas (MPAs) with intense fishing activities; then organize workshops with fishermen and MPA authorities and design a monitoring program with fishermen participation.

Implementation of Reef Check activities under the ICRAN-MAR project served to produce continuous presence on the ground (and in the water) of RC trainers and trained divers in the monitoring of ecological and socio economical aspects of coral reef health. Allowing non-scientist to collect valuable data and educational support in areas where highly expensive and isolated scientific expeditions were lacking or had limited capacity. This can be easily measured in the vast amount of data collected over the life of the project, which is contributing valuable information for local managers, general public and to the Global Coral Reef Monitoring Network and that is available online free of charge. In addition, local dive centers started to get the necessary tools to get involved in local reef conservation efforts while they receive financial incentives to offer an added value service to their clients.

Sustainable Tourism

Over the course of the project, partners CORAL, UNEP-DTIE and WWF promoted sustainable tourism in the region by: a) Fostering regional dialogues across a broad sector of industry stakeholders leading to collaborative action on embracing sustainable tourism, b) Facilitating the development of standards and a voluntary code of conduct that can be applied throughout the Mesoamerican region and potentially elsewhere in the Caribbean, and, c) Providing training and support for adoption of the code of conduct complete, leading to the private sector in the MAR being fully engaged in the practice and promotion of sustainable marine tourism. They facilitated a stakeholder-led process in the marine tourism industry, resulting in the development of an innovative comprehensive set of conservation and safety standards for marine recreation activities such as scuba diving, snorkeling and boating operations.

Workshop trainings in three project pilot sites (Placencia-Belize, Roatan-Honduras, Playa del Carmen-Mexico) improved the capacity of these communities to address coral reef threats by: a) increasing awareness of reef ecology and sustainable business practices, b) improving local capacity for collaborative coral reef conservation efforts through technical and financial assistance, and c) providing both a process and end product (standards) which will lead to implementation of a code of conduct for marine tourism operations. Over 300 stakeholders in the region benefited from these activities.

After the standards were unanimously approved by a balloting process with participating of more than 160 local stakeholders (taskforce committee), project partners initiated a standard testing process that will continue until December 2007 and that will dictate the potential for replication in the region and elsewhere. Over 40 companies from across the region signed a letter of agreement to work with CORAL to participate in this process. It is expect that this program will provide a significant amount of data and anecdotal responses that reflect changes in industry practices, measure the effectiveness of the standards, and provide guidance for the future direction of the project.

Early findings allowed partners to identify that there had been very limited education and awareness training on many sustainable tourism and reef conservation issues, and both individuals and associations in the project pilot sites were regularly requesting additional assistance from CORAL in addressing reef threats and promoting sustainable practices. While

tremendous progress in securing buy-in to the process of standards development and implementation was achieved, it also became clear that it will require several years of work in the region to ensure widespread adoption of the standards and code of conduct.

Partnership Building/strengthening

Seeking ways to promote long-term sustainability of the project's outcomes, coordinating and implementing partners actively engaged in leveraging and bringing the project to the attention of other stakeholders in the region. They participated in several activities throughout the Mesoamerican region (e.g. Tulum+8 meetings, the Second Mesoamerican Congress on Protected Areas, and ITMEMS-3) interacting with local communities, governments, NGOs, Scientists, and the Private Sector to discuss ways to strengthen conservation actions and sustainable management in the region. On the technical side, implementing partners continuously sought ways to enhance activities and leverage project impacts. Among others, CORAL established a pro bono agreement with Underwriters Laboratories Inc. for use of their online standards development software; likewise, WWF managed to secure additional funding from Summit Foundation to continue their on-the-ground work on promotion of better practices.

In addition to coordinating and supervising the implementation of the technical activities, efforts were made to ensure that duplication of actions was avoided or minimized at best, and that the use of the available financial resources was optimized. This was possible through meetings and discussions with representatives of organizations and institutions in the region to identify opportunities for collaboration. The spirit of building alliances and leveraging partnerships in benefit of the coral reefs in the Mesoamerican region has been a primary objective for the ICRAN-MAR project and therefore a priority for the project coordination.

Multiple efforts for approaching to different stakeholders of the MAR region were undertaken, particularly with other regional projects such as the Mesoamerican Barrier Reef System (MBRS), The Nature Conservancy (TNC), The Mesoamerican Reef Fund (MAR Fund), Rainforest Alliance, the Ecorregional Program of the World Wildlife Fund (WWF) and the Conservation of the Mesoamerican Reef Program from Summit Foundation; and with private industries as CropLife Latin America. The level of collaboration/communication with these institutions varied and in some cases materialized into further collaboration (e.g. CORAL and TNC supporting sustainable tourism activities in the region beyond the life of the ICRAN-MAR project).

Management and Administration – Coordination Support

The role of the coordination unit was fundamental in supporting project performance. Overall project performance benefited from the coordination's role in facilitating close follow-ups, constant communication, and transparency with project partners and other stakeholders in the region.

Under the direct supervision of UNEP-CAR/RCU and ICRAN, the coordination unit based in Belize City – Project Coordinator and Project Assistant engaged, among others, in the following activities:

- Facilitating communication between project partners for the timely and coordinated execution of project activities
- Facilitating direct communications between partners and project coordinator to foster transparency and provide feedback
- Facilitating communications between donors and partners

- Following up on project performance by providing feedback to implementing partners on progress reports and participating at different field activities
- Preparing consolidated reports to donors
- Providing logistical support to partners' activities – workshops, events, etc.
- Providing support to partners by securing endorsements for the project's components through follow up communications with other regional stakeholders with whom partners are building a relationship
- Attending different regional meetings to present project advances and raise the profile of the ICRAN-MAR project.
- Meeting with donors and other regional initiatives to brief on project advances
- Seeking consolidation of collaboration with other partners in the region
- Encouraging partners to participate at different venues to present project results
- Updating project website and producing promotional materials for the project
- Organizing meetings of the TOC and SOSC
- Working with the project assistant in Belize and the financial assistant in Jamaica to ensure proper and timely management of finances and reporting requirements.

United Nations Role- Impact:

UNEP's credibility and support was crucial to complete the activities committed by this project; an example is the opportunity to get funding from CropLife Latin America to implement ICRAN-MAR activities in sugarcane fields in Chetumal Bay – Mexico, it would have been impossible without the UNEP participation. In addition to this, UNEP's personnel were very helpful in providing ideas for implementation of activities on the field as well as getting partners on track when deviating from long-term targets. Finally, their support was vital on more than one occasion regarding clarification of budgets, budget re-allocation requests, and reporting requirements.

MAJOR IMPACTS

For specific impacts by component please refer to section II of this report

- **Local Empowerment** – As a result of this project partners have helped strengthening several NGOs and community-level individuals in the region who now have the capacity to monitor coral reef ecological and socio-economic parameters using the Reef Check protocol for years to come; they have learned about the programs implemented by the other alliance members and how partners can collaborate with them in the future. For example, Reef Check's Eco Action program fits well with the Tourism Best Practices of CORAL and partners can work together in this area.
- **Local solutions to a global problem** – Reef Check's approach and extensive network of volunteers is now forever present in the MAR region. Local communities, NGOs and individuals are now capable of be part of the solution to the global coral reef crisis by providing valuable data to MPA managers, local authorities and scientists on a frequent and regular basis like no other monitoring protocol has achieved. Data collection and availability makes the decision-making process very dynamic and efficient with respect to updated knowledge on reef health.
- **Potential to support MPA management** – The region-wide success of the ICRAN MAR tourism initiative has laid the groundwork for rapid near-term advances in standards

implementation and improved Marine Protected Area (MPA) management across the entire Mesoamerican Reef system. Additionally, the pioneering alliances that were developed as a result of locally-led conservation initiatives have not only forged new relationships within the private sector, but also between the private sector and resource managers.

- **Increased awareness** – Trainings in *Sustainable Marine Recreation* have measurably heightened awareness of coral reef ecology, sustainable business practices, and the need to build capacity for locally-led conservation. As a result of these combined efforts, project partners are well poised to make steady gains in improving the environmental performance of the marine tourism sector, achieving sustainable financing for local initiatives, reducing coral reef threats, and maximizing private sector contributions to effective protected area management.
- **Catalytic effects** – As a result of the efforts and results achieved under the fisheries component other initiatives were launched, such as the MSC certification in lobster fisheries in Mexico and the private-public partnership between DARDEN, APESCA y DIGEPESCA, where WWF is facilitating the process and giving technical support.
- **Expanding alliances and private-public-partnerships** – Cooperation agreements with the major agribusiness, tourism operators and sea food service industry were signed during the three years of implementation. Furthermore, at least 3 formal alliances with cooperatives and governmental agencies were signed and implemented. This project has increased both the interest and enthusiasm of stakeholders through out the region to develop partnerships and build capacity within their own destinations to promote sustainable business practices, support local MPAs, and conserve their coral reef resources. Many individuals and businesses are now proving to be a driving force in their communities to make the marine recreation standards, agriculture or fisheries BMP's a common practice in their region. Ultimately, they will be protecting their livelihoods by protecting their reef.
- **Filling information GAPS** – This project has facilitated the information exchanges between public and private stakeholders; that is the case of the tourism standards validation or with the biological control of the frog hopper between three countries. The lobster fishery industry and the Honduras government to making the first lobster stock assessment to define future regulations to prevent this fishery over-exploitation is other good example of this information exchange.
- **From local to global** – The ecoregional efforts made under the ICRAN-MAR project contribute to addressing key the drivers or root causes of global environmental problems. In that regard project results contribute to the solution of global problems beyond the boundaries of a single ecoregion.

COORDINATION AND MANAGEMENT – LESSONS LEARNED/RECOMMENDATIONS

- During the project, the workplan formats evolved and became a very useful tool that supported the daily work. This was a key element that facilitated the communication between the Project Coordinator and the partners, as well as the communication between partners so we suggest in future initiatives to continue with this management tool.
- Project coordination proved to be a key factor in the successful implementation of the ICRAN-MAR project, and such, future multi partner projects should have a similar strong coordinating unit to oversee and link partner's activities for a better performance in achieving overall goals of the project.

- Making a meticulous staff selection for Project management and coordination is very important to guarantee the success of similar projects. Coordination is important to maintain informed all the partners and at the same time communication with sponsors.
- It is important for Project officers to have the capability to adapt to external situations or conditions. Officers must be clear that some assumptions may not be correct, and the best decisions must be made considering budget constrains, in close collaboration with Project Coordinator. In this regard, it is desirable to re-define expected results, outputs and activities, in order to make an optimum investment of human and financial resources.
- .Conformation of a Technical Oversight Committee (TOC) was tremendously positive for the implementation and progress of the project. The continual TOC meetings and the constant communication and feedback promoted by the coordination allowed sharing experiences between the partners of the project. This synergy served to avoid potential difficulties during execution, and to plan activities on solid bases.
- Coordination efforts with local and national governments, private sector, conservation organizations and donors are necessary, but many times project budgets underestimate the costs and resources necessary to carry out this activity.
- Negotiation skills are necessary to build a win-win relationship with the private sector. Through the process of building private-public partnerships or when facilitating such a process between communities and private entities, it is very important refine the negotiation skills of the field team.
- It is important for partners to continue acquiring resources that can maintain tourism trainings, and access to tools, microgrants, and technical assistance for stakeholders throughout the MAR. There is an upsurge of interest in protecting of coral reef ecosystems throughout Mexico, Belize, Guatemala, and Honduras. Yet testimonials throughout the region demonstrate that capacity for conservation remains limited, and that without capitalizing on the momentum generated from the success of this initiative, progress could be lost in a matter of months.
- Dissemination of the ICRAN-MAR Project through a carefully reviewed Publication would improve the design and implementation of other potential projects.
- Commitment and ownership. The key player of the conservation initiatives in the short- and long-term success is commitment and ownership by public and private stakeholders, especially at the local level. Ownership and commitment are easily achieved by far when stakeholders, or, more appropriately, our partners, dedicate resources to joint actions.

THE WAY AHEAD – VALUE ADDED FROM THE ICRAN-MAR ALLIANCE

- Project partners are now well positioned to continue capacity building efforts and development of local partnerships and alliances which will improve sustainable business practices, community-wide support for sustainable tourism and fisheries in the conservation efforts in these areas at the local level. At the same time, in the agriculture initiative WWF has consolidated a very strong relationship with the industry.
- In addition to needed follow-up work in the pilot sites, partners are well positioned to increase their presence and ability to promote conservation and sustainability in several “non-pilot site” destinations in the region.
- Project partners are in a good position to continue developing the efforts in Agriculture, Fisheries and in fewer levels in Tourism. At the present USAID is funding a watershed conservation initiative that will include several of the information and initiatives started in ICRAN-MAR project, mostly some of them related with private sector support to get the

protected areas system financial sustainability. Many of the local partners will continue working in alliance with WWF for similar activities in the same areas.

- Partners are well poised to continue capacity building efforts in support of sustainable marine tourism and to facilitate rapid advances in the widespread adoption of the standards and Code of Conduct throughout the Mesoamerica region. Continuation of these efforts will promote good environmental business practices, build conservation alliances, ensure sustainable financing for conservation, reduce threats, and support effective protected area management.
- Over the course of the project, the ICRAN-MAR Alliance has been a key conservation mechanism that supported a very powerful set of brain power focused on solving important local problems with relatively low technology and limited funds. While implementing partners already work with hundreds of NGOs, businesses and government agencies around the world, this alliance forced some NGOs to communicate and collaborate to make this project successful. This alliance is now in place for future collaboration efforts which ensures an ever better performance in the continuation of ICRAN-MAR follow up activities. The collaboration of these organizations to create the alliance and the meetings and reports produced also allowed a lot of cross fertilization of ideas from a very wide variety of sectors, forcing a wider view, from mountain top to seabed than is typical.
- The ICRAN-MAR alliance has played a rather important function representing the members in front of the governments and other civil society stakeholders developing lobbying activities
- It has helped proposing new regulations or modifications to the law related with environment, conservation, fisheries or other natural resources management and legal framework.
- Promoting and leading monitoring activities that show the impact in the reef conservation (e.g. following the protocols of Healthy Reef Initiative)
- Planning, developing and fundraising for joint projects as this one
- Sharing and coordinating strategic plans between institutions to get maximum possible impact
- Developing, managing or supporting watch-dog systems as “Vigilantes del Golfo”
- Learning network, developing knowledge management system for MAR
- Consolidating relationships and support from other alliances around the world
- Implementing joint events as trainings and others, to improve the cost-benefit rate

PROJECT STATISTICS – OVERALL INDICATORS

The following indicators are extracted from the project statistics tables below. For more details about particular aspects please refer to Section II of this report. Comprehensive table of final project indicators –by component– can be found in Section III of this report

Table 1: Number of Institutions/Communities Involved Per Sector

See figures 1-8 below

SECTOR	QUANTITY ⁽¹⁾	WM	SF	ST
Govt Agencies	34	16	8	15
Local NGOs	22	7	10	9
Other NGOs/Regional Initiatives	18	10	2	8
Local communities	58	0	56	4
National Institutions ⁽²⁾	23	10	5	8
Private Sector	115	20	20	77
<i>Total</i>	<i>270</i>	<i>63</i>	<i>101</i>	<i>121</i>

WM: Watershed Management

SF: Sustainable Fisheries

ST: Sustainable Tourism

(1) Approximate numbers; (2) e.g. Universities, research centers

Table 2: Leveraged Funds - over \$1,600,000 USD in support of activities under the three components

LEVERAGED FUNDS - USD	SOURCE	PARTNER	COMPONENT	SCOPE/COMMENTS
\$100,000	Oak Foundation	CORAL	ST	Three-year matching grant
\$20,000	Summit Foundation	CORAL	ST	In support of tourism stakeholder attendance and participation at the Tulum +8 conference in Cancun, Mexico.
\$57,000	Summit Foundation	CORAL	ST	To facilitate execution of environmental performance assessments, training, and technical assistance with marine recreation providers on the island of Cozumel, Mexico, with a specific focus on cruise industry contractors. The project, to be executed jointly with Conservation International (CI), has the primary goal of minimizing impacts to Cozumel's reef resulting from the rapid growth of cruise tourism on the island in recent years. While CI will engage the demand side of the tourism sector, CORAL will work directly with marine recreation providers, utilizing the ICARAN MAR standards as the primary assessment and training tool for application of better business practices.

LEVERAGED FUNDS - USD	SOURCE	PARTNER	COMPONENT	SCOPE/COMMENTS
\$113,500	R. B. Toth Associates	CORAL	ST	In-kind services provided by internationally renowned standards consultant Bob Toth for guidance in the standards development process
\$100,000	Underwriters Laboratories	CORAL	ST	A pro-bono contract for use of online Collaborative Standards Development Software (CSDS) to facilitate the process of standards development.
\$23,000	National Marine Sanctuary Foundation	CORAL	ST	To add San Pedro, Belize and Cozumel, Mexico as new tourism pilot sites in the MAR region. In each site, partners will engage stakeholders with the Sustainable Marine Recreation and Conservation in Action training series, and will further provide technical and financial support for locally led projects
\$40,000	National Fish and Wildlife Foundation	CORAL	ST	To add San Pedro, Belize and Cozumel, Mexico as new tourism pilot sites in the MAR region. In each site, partners will engage stakeholders with the Sustainable Marine Recreation and Conservation in Action training series, and will further provide technical and financial support for locally led projects
\$10,000	TMM Boat Charters, Belize	CORAL	ST	Matching grant for community conservation Action Plan in Placencia, Belize – Mooring Masters Project
\$200,000	FFEM	WWF	SF	For fisheries management in 3 Marine Protected Areas (Punta de Manabique, Cuero y Salado, Cayos Cochinos); promotion of best fishing practices, development of management plans.
\$200,000	Water Fund	WWF	WM	In Guatemala
\$30,000	Croplife	WWF	WM	For activities to measure the impact and the bioaccumulation of agricultural effluents on targeted species within the Mesoamerican Reef
\$36,000	FFEM	WWF	SF	In support of EBFM, Alternative livelihoods, and Lobster BFP
\$45,000	Kukulcan Plaza	WWF	SF	In support of EBFM and Alternative livelihoods
\$450,000	Summit Foundation	WWF	WM	Support for bioaccumulation monitoring of marine life within the Mesoamerican Reef to identify agricultural threats. \$150,000/year throughout the life of the project. Support in the preparation of the Monitoring Protocol
\$50,000	Summit Foundation	WWF	SF	In support of fishermen villages severely impacted by Hurricane Wilma, in November 2005. The purpose of these funds was to pay salaries of unemployed fishermen from Holbox and Chiquila in an ecological monitoring program led by WWF experts.
\$50,000	Summit Foundation	WWF	SF	In support of EBFM activities
\$51,150	Sustainable Fisheries Fund	WWF	SF	In support of MSC lobster certification activities
\$75,000	Munson	WWF	SF	In support of EBFM activities
In-Kind	UNEP	UNEP-WCMC	WM	Work on the GEO4 scenarios was co-opted for use in this project, leveraging the considerable investment by UNEP in the regional to global scale scenarios process and models.

WM: Watershed Management, SF: Sustainable Fisheries, ST: Sustainable Tourism

Table 3: Leveraged Impacts – originated from project objectives not contemplated in original project document

ORIGINAL ICRAN-MAR ACTIVITY	PARTNER	COMPONENT	IMPACT
Identify agricultural threats to the MAR	WWF	WM	<ul style="list-style-type: none"> Leveraged support from Summit to undertake bioaccumulation studies Development of monitoring protocol to conduct toxic bioaccumulation testing in the region. WWF has completed 4 rounds of testing in Chetumal Bay Mexico, Belize, and Honduras This protocol has been adapted by EPA and NOAA for water quality monitoring in Hurricane Katrina-affected areas. In addition, the Government of New Zealand has adopted the protocol as the official standards for bioaccumulation sampling and lab analysis for the country. WWF is extending the use of this protocol for bioaccumulation assessments in the Coral Triangle, the Amazon, the Gulf of California, East Africa Marine, and the Mekong
Implement BMPs	WWF	WM	SabMiller (The Coca-Cola Company), decided that its key sugarcane producer in Central America (AZUNOSA) signed a collaborative agreement with WWF to work together on BMPs
Implementation of better practices	WWF	All	WWF international wants to replicate the structure and holistic approach of the ICRAN-MAR in other parts of the world.
Community-based ecological and socio-economic monitoring	RC	SF	<ul style="list-style-type: none"> Local communities empowered to be part of management actions being designed for the region Data serves to raise awareness of the coral reef crisis at a local level (reporting bleaching event 2005), making emphasis that these crisis occurs also at the global level. Data collected by participants can be viewed, analyzed and compared globally free of charge online at www.reefcheck.org/datamanagement
Good practices for marine recreation	CORAL	ST	Partnerships with other conservation organizations (e.g. CI) to replicate the strategy in other pilot sites in the region
Community-based fishery management improved through development of appropriate partnerships with private and public sector	WWF	SF	WWF is developing an alliance with OSPESCA, the regional organization in charge of fisheries, to make recommendations to the Honduras government on its institutional arrangement for fisheries management (and overcome the hurdle of changes in fishery policies with every change in governmental period of 4 years in Honduras)

WM: Watershed Management, SF: Sustainable Fisheries, ST: Sustainable Tourism

Table 4: Project Products used by other institutions – raising the profile of the ICRAN-MAR project

OBJECTIVE	RESULT	PARTNER	COMPONENT	USED BY
Identify agricultural threats to the MAR	Developed a Monitoring Protocol	WWF	WM	Project partners, NOAA, Government of New Zealand
Community-based ecological and socio-economic monitoring	Monitoring data	RC	SF	Provided data to NOAA Coral Reef Watch on the main 2005 Caribbean bleaching event; data from before, during, and immediately after the period June 2005-January 2006.

WM: Watershed Management, SF: Sustainable Fisheries

Table 5: Beneficiaries – over 1,000 direct beneficiaries through various activities in the 3 components

PEOPLE – BENEFICIARIES	COMPONENT	COUNTRY	COMMENTS
25 people trained in the Modelling tools	WM	Regional	Participation at Watershed Management Workshop
More than 50 regional stakeholders informed in preliminary results of watershed analysis	WM	Regional	Participation at Watershed Management Workshop
More than 200 farmers of the Orange Walk District Division.	WM	Belize	Participation at training in the use of biological control to fight the sugar cane Froghopper (<i>Aeneolamia spp.</i>) using the fungus <i>Metarhizium anisopliae</i>
More than 150 local stakeholders trained in the Reef Check protocol	SF	Regional	Participation at various Reef Check trainings and workshops
Over 300 Fishermen from the 4 countries	SF	Regional	Participation at various Best Fishing Practices studies, publications, workshops and trainings; EBFM; alternative livelihoods
Over 300 individuals from the MAR trained and sensitized on tourism best practices	ST	Regional	Training and participation in development of standards and codes of conduct for marine recreation activities, as well as on the value of coral reefs (including all national and first pilot workshops)

WM: Watershed Management, SF: Sustainable Fisheries, ST: Sustainable Tourism

Figures 1-8. Participation of various organizations by country and component. See Annex 1 for detailed tables

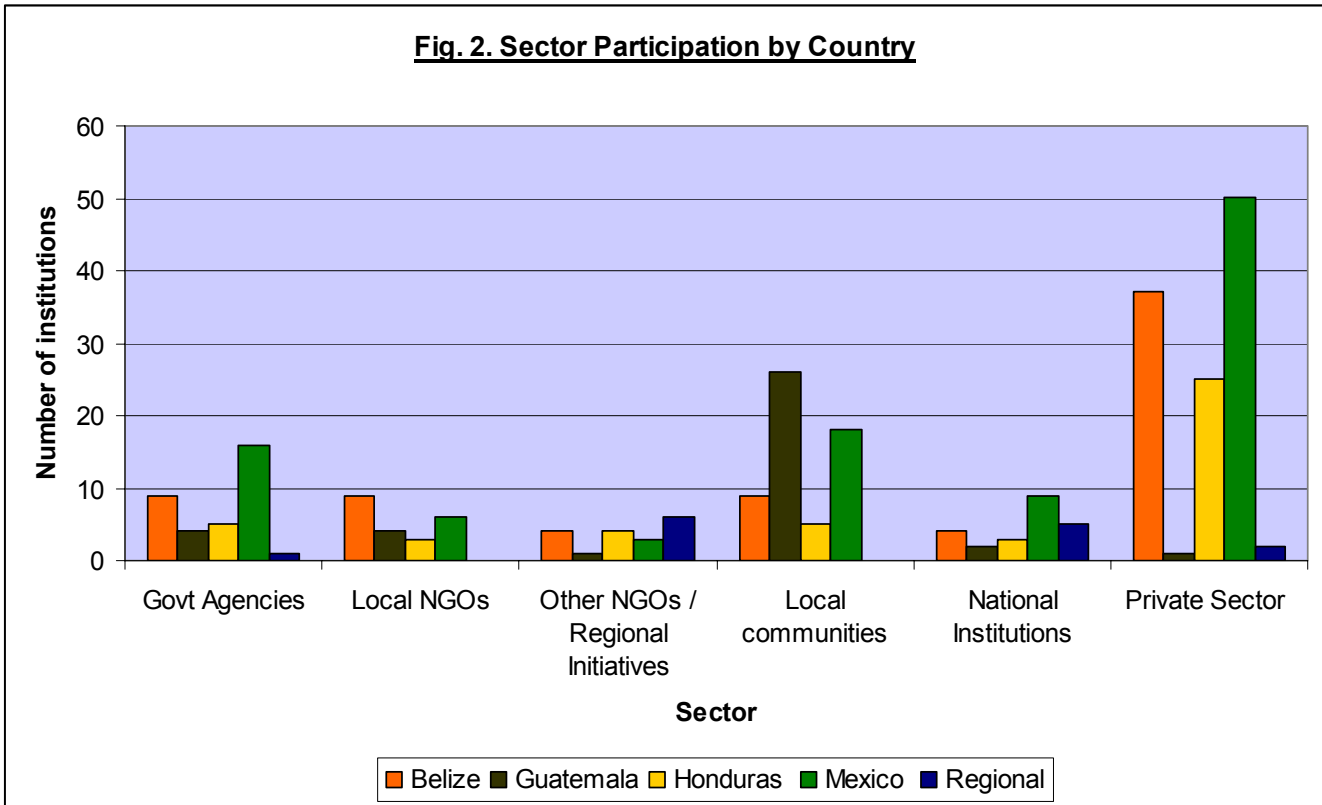
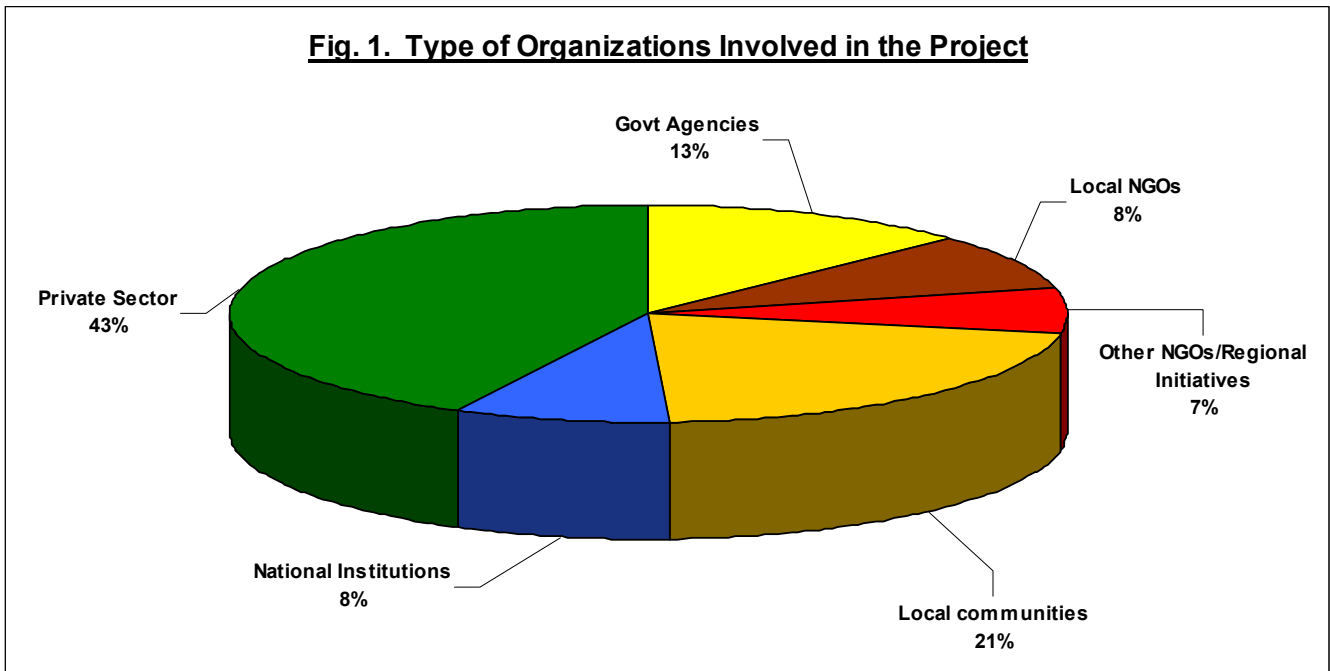


Fig. 3. Government Agencies Participation by Component

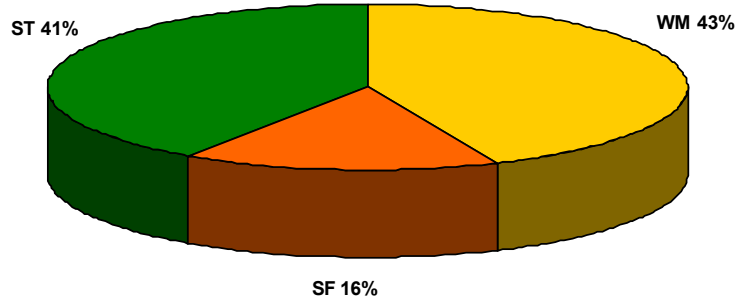


Fig. 4. Local NGOs Participation by Component

WM:
Watershed
Management

SF:
Sustainable
Fisheries

ST:
Sustainable
Tourism

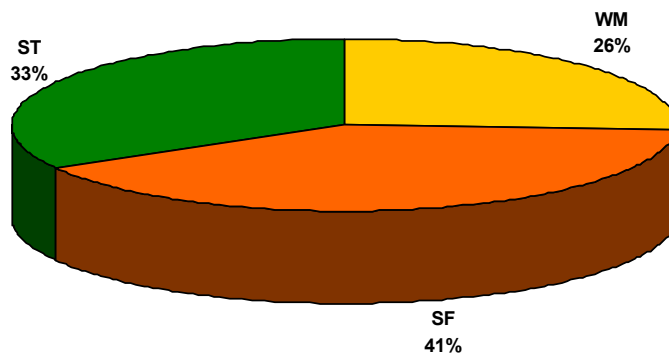
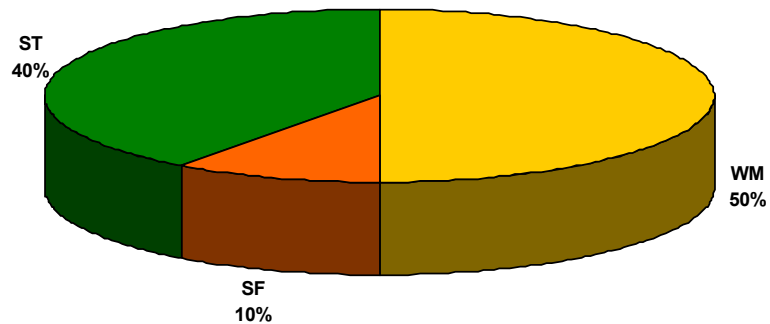
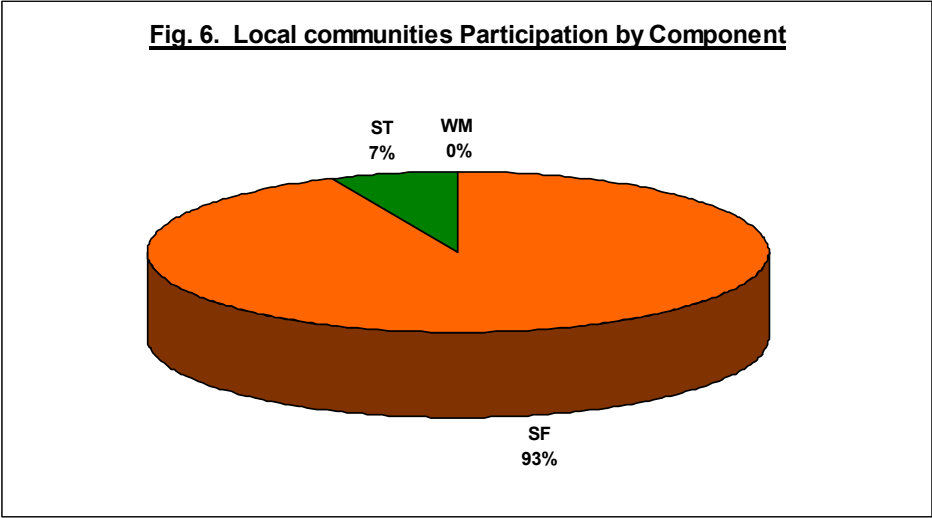


Fig. 5. Other NGOs/Regional Initiatives Participation by Component

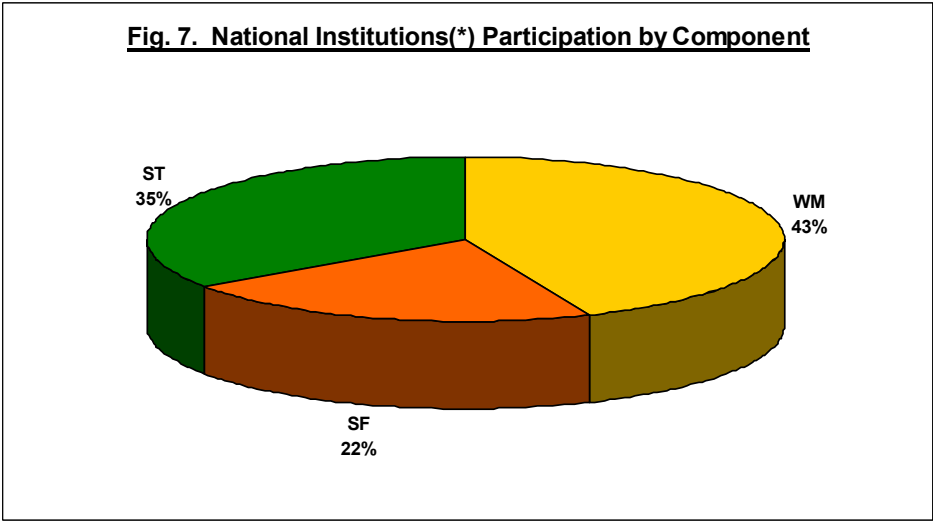




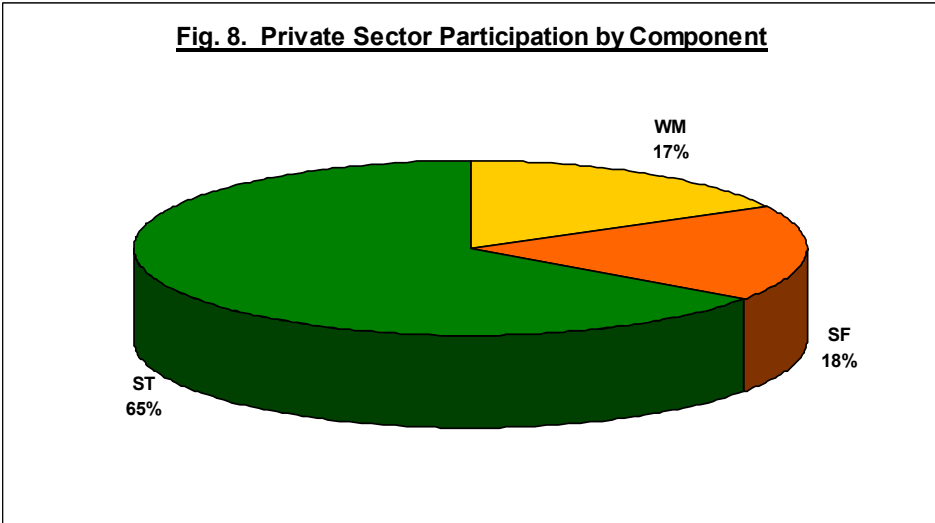
WM:
Watershed
Management

SF:
Sustainable
Fisheries

ST:
Sustainable
Tourism



(*) National Institutions: e.g. Universities, research centers



I. PROJECT DESCRIPTION AND OBJECTIVES

The Mesoamerican Reef is the largest barrier reef system in the Western Hemisphere and the second largest in the world. It extends from the Yucatan Peninsula in Mexico through Belize and Guatemala, to the Bay Islands of Honduras. Its waters are home to 66 species of corals and more than 400 species of reef fish. The entire coastal system encompasses habitats and ecosystems such as barrier and patch reefs, riverine and coastal mangroves, seagrass beds and atolls that are critical to the survival of numerous marine and terrestrial species. Its significance as a globally outstanding example of a coral reef complex is reflected in its designation as one of the world's natural wonders, with some portions as World Heritage sites. The reef serves as an important source of economically valuable resources for many coastal populations from the Yucatan in the North to Honduras in the South.

In recognition of the ecological and socio-economic richness and importance of the Mesoamerican Barrier Reef region (MAR), the ICRAN Mesoamerican Reef Alliance (ICRAN-MAR) project was designed in 2003 to contribute to the many local, national and regional-level resource conservation and sustainable development projects that had been initiated in the MAR region since 1990. Discussions among ICRAN representatives and conservation leaders in the MAR region had established that there were opportunities where ICRAN could, and should, become engaged.

As a result, ICRAN partners developed a 3-year initiative to address threats to the MAR under three components known for their potential to strongly impact the coastal and marine ecosystems: watershed management, sustainable fishing, and sustainable tourism. With the generous support of the United States Agency for International Development (USAID) and the United Nations Foundation (UNF), the ICRAN-MAR partners would conduct a set of inter-linked, complementary activities to enable the proliferation of good practices for coral reef management and conservation. The strategy of this Alliance would combine a conservation and sustainable management approach with the creation of partnerships with the private sector to leverage resources and talents to find long-term solutions. Project donors UNF and USAID signed the project agreement on November 2, 2003 and implementing partners initiated project activities in the period of July-September 2004 once technical, logistical, and individual contractual arrangements were finalized.

Project implementing partners are the World Resources Institute (WRI), UNEP-World Conservation Monitoring Centre (WCMC), World Wildlife Fund (WWF), The Coral Reef Alliance (CORAL), UNEP-Division of Technology Industry and Economics (DTIE), and Reef Check. After nearly 3 years of activities, implementing partners achieved significant results, exceeding original expectations in various instances..

The following sections present highlights of project implementation. Please refer to previous half-yearly reports for more detailed information about specific project activities.

A. STRATEGIC OBJECTIVE AND INTERMEDIATE RESULTS

The unifying Strategic Objective (SO) of the ICRAN-MAR Alliance is:

Alliances built with the private sector that lead to the sustainable management and viability of the Mesoamerican Reef (MAR).

Intermediate Result (1): Partnerships created that produce relevant information and forecasting resulting in improved watershed management in areas impacting the Mesoamerican Reef.

- 1.1 Partnerships established with the agri-business community resulting in adoption and implementation of best practices.
- 1.2 Trends in land use integrated with spatial, hydrological and oceanographic models for use in modeling.
- 1.3 Scientific information and modeling results used to influence decision-makers regarding land-use policies in order to decrease threats to coral reefs of the MAR.

Intermediate Result (2): Local fishers' and cooperatives' capacity strengthened for sustainable fisheries management. (Through the development of industry partnerships, promotion of "best practices", training in financial management, resource management, and alternative income generation strategies.)

- 2.1 Community-based fishery management improved through development of appropriate partnerships with private and public sector.
- 2.2 Community-based ecological and socio-economic monitoring implemented where appropriate to support community assessment and monitoring of their progress in resource management.
- 2.3 Key marine protected areas strengthened in collaboration with GEF/MBRS and PROARCA/APM (to demonstrate successful community-based fisheries to the wider community).

Intermediate Result (3): Through partnerships established with the marine tourism sector, business guidelines and best practices are refined and implemented, thus creating a sustainable industry minimizing threats to the MAR.

- 3.1 Regional policy dialogues and multi-sectoral for strengthened for collaborative action on embracing sustainable tourism by all stakeholders.
- 3.2 Refinement and adoption of sustainable tourism best practices that have been identified and leveraged within the MAR and elsewhere in the Caribbean region.
- 3.3 A regional environmental code of conduct implemented for providers of recreation/tourism practices affecting the MAR.
- 3.4 Use of demonstration sites, in addition to national level workshops, to train marine recreation providers and suppliers in best practices.
- 3.5 Private and social sector operating in the MAR fully engaged in the promotion and implementation of the best practices identified.

II. IMPLEMENTATION OF PROJECT COMPONENTS 2004-2007

The project evolved since its original inceptions and over the course of the implementation phase. Earlier stages required significant investments to set up the necessary mechanisms to undertake planned activities and achieve project goals. This included, among others, gathering information and building relationships with local counterparts. Initial results provided a good platform not only to leverage further support from governments and the private sector but also to inform and influence decision makers in the region. Over the course of these years, ICRAN-

MAR partners capitalized on lessons learned and strengthened channels of communication with project partners and other initiatives in the region.

While the three components of the project were closely interlinked and designed to pursue the overall goal of contributing to the sustainable management and use of the Mesoamerican Reef, each component had particular characteristics and different levels of complexity. The high dynamism of the project activities and the challenges they produced, called for adopting an adaptive approach to allow addressing changes in the implementation mechanisms as appropriate. Under the supervision of the Project Coordinator and the guidance of UNEP-CAR/RCU this approach facilitated the reorientation of investments —consequent with the project's objectives— as necessary.

The spirit of creating alliances and consolidating societies with the private sector for the benefit of coral reefs in the Mesoamerican region has been the fundamental objective of the ICRAN-MAR Project. The positive results obtained by the project demonstrate that alliances are an effective mechanism for the handling of marine resources and can bring great benefits for the handling of Marine resources. Nevertheless, coordinating efforts requires commitment and joint work to identify the best strategies that involve relevant stakeholders and especially the local partners.

A. IMPROVED WATERSHED MANAGEMENT (IR1)

Partnerships created that produce relevant information and forecasting resulting in improved watershed management in areas impacting the Mesoamerican Reef

1. Threats – Rationale for Component Design

Alteration of the natural landscape for development, road construction, or agriculture can have adverse impacts on coral reefs through increased delivery of sediment, nutrients, and other pollutants to coastal waters. In the Mesoamerican region, over 300,000 hectares of land are allocated to banana, oil palm, sugar cane, citrus, and pineapple crop production. Eroded sediments and fertilizer and pesticide residues used by farms drain through rivers and streams and enter coastal waters along the Mesoamerican reef.

As the largest industry within the Mesoamerican Reef, commercial and subsistence agriculture employ more than one million people and can generate more than ten percent of the Gross National Product in the MAR Countries. Pasture and cropland provide habitat and food for the majority of the region's terrestrial biodiversity. Soils managed by farmers and ranchers are integral to ecological processes like conserving and filtering freshwater, sequestering carbon, and maintaining biological diversity. With its deep connections to the economy of the region, human societies, livelihoods and biodiversity, agriculture is one of the most important issues and challenges for conservation of life on the Mesoamerican Reef. Consequently, appropriate land-use practices are critical for the management of watersheds to ensure that the transport of sediment, nutrients and other pollutants to coral reefs is minimized.

Partners World Resources Institute (WRI), UNEP-World Conservation Monitoring Centre (WCMC) and World Wildlife Fund (WWF) collaborated in this component to provide a comprehensive watershed analysis to help decision making for improved watershed management in the MAR.

2. Description of Component Strategy – Dynamics

This component was integrated by two complementary sub-components:

- a) WWF focused its efforts identifying sources of pollution and sediment from agricultural activities that have a negative impact on the marine environment, as well as on-the-ground activities with agricultural businesses to adopt a suite of “better management practices”. This work was designed to be carried out in three years and produced concrete innovative results for the MAR region; activities will continue well beyond the life of the ICRAN-MAR project with leveraged support from various sources.
- b) WRI and UNEP-WCMC produced information and GIS tools for examining the potential impact of different land use and development options in the region and the associated impacts on water quality on the MAR. These hydrologic models and diagnostic tools help educate and encourage key stakeholders to implement better management practices to reduce impacts on the coastal and marine resources. This work was designed to be carried out during the first two years of the project; tools and results have been disseminated and some local institutions will continue follow up actions (further validation of models) beyond the life of the ICRAN-MAR project.

In summary:

- UNEP-WCMC – conducted review of historical land use change and supplemented it by compiling statistical data to feed analysis of the land use change drivers; developed land cover change scenarios and provided data sets as input to the hydrologic modeling; facilitated capacity-building activities and follow-up to regional stakeholders
- WRI – implemented the watershed delineation and hydrologic analysis for the MAR region, performed analysis of vulnerability to erosion, and coordinated a circulation modeling along the MAR;
- WWF – lead (still is, and will continue to do so after the end of the ICRAN-MAR) the work with agri-business (banana, pineapple, citrus and sugar) to implement better management practices, focused on reducing the presence of pesticides in the MAR marine environment and controlling soil erosion from major commercial agricultural sectors.

Since the early stages of project implementation partners consulted extensively with regional experts, other regional partners, and the private sector to seek feedback, identify opportunities for collaboration, and develop close relationships with the agroindustry for the adoption of better management practices. Data collection and information gathering was possible through collaboration with local institutions, other regional initiatives, and by building on previous work carried out in the region, such as the Reefs at Risk study led by WRI. Likewise, information was shared and feedback was sought from regional counterparts like the USAID PROARCA program and the CCAD/GEF Mesoamerican Barrier Reef System (MBRS) Project.

Taking into account the number of activities within the MAR region whose focus was on watersheds and analysis of land-based sources of threat to coral reefs, the ICRAN-MAR watershed theme partners made considerable efforts to coordinate such activities. Successful collaboration was achieved with the Belize Tropical Forest Studies, Hydrology-Meteorology Department, and the Coastal Zone Management Authority and Institute (CZMAI). Another significant activity focused on watersheds (specifically trans-boundary watersheds) was organized by the MBRS project and implemented by US National Oceanographic and Atmospheric Administration (NOAA) and efforts were made to ensure linkages and facilitate information sharing. See Annex 1 for a comprehensive list of organizations involved.

3. Major Outputs/Results – Impacts in the Region

The current section provides a narrative description of project results and the impacts these have generated in the region. It also describes the potential opportunities for continuation beyond the life of the ICRAN-MAR project. For a summarizing table of project indicators and status, refer to the indicators section of the executive summary in this report.

Partnerships with agribusiness

Sub-result 1.1. *Partnerships established with the agri-business community resulting in adoption and implementation of best practices.*

The work carried out under the leadership of WWF has undergone a process by which partners were able to first set up the grounds for collaboration with local agribusiness, identifying most pressing threats, and then undertaking specific activities that are yielding significant results for the promotion and adoption of Better Management Practices (BMPs). Along the way, they have been able not only to create partnerships with relevant agribusiness and governments in the region, but also to raise awareness and leverage support from other funding sources.

WWF's approach to addressing agricultural impacts in the Mesoamerican Reef (MAR) is to reduce the presence of the most toxic pesticides in the marine environment and reduce soil erosion from major commercial agricultural sectors. This approach engages strategic partners throughout the market chain and key agro-industries to achieve overall goals (by means of agreements to promote BMPs and monitoring environmental impacts). Strategic partners include producers, processors, traders and buyers. The key agricultural crops that have been identified as having the most impact on the reef include sugarcane, citrus, bananas, pineapple and palm oil.

WWF achieved expected outputs as originally planned despite slight variations in implementation due early delays in signing agreements with key agroindustries. Signature of MoUs with agribusiness were possible after developing trust and clearly discussing matters such as property rights, confidentiality issues, self-protectiveness, and legal issues.

A) MAJOR OUTPUTS:

1) Agreements (MOUs) signed with agribusiness for the promotion of BMPs.

WWF signed agreements of collaboration with Chiquita, CropLife Latin America, Dole Food Company Latin America, Fyffes, *Fundación de Investigación Agrícola* (FHIA), The Association of Citrus Producers from Sonaguera, Honduras (ACISON), and *Azucarera del Norte, S. A.* (AZUNOSA) in Northern Honduras, the Citrus Growers Association in Stann Creek District in Belize, the Sugarcane Growers Associations, Corozal and Orange Walk Divisions in Belize, and PALSA/AGROTOR. See Annexes 2 and 3. In coordination with WWF, these corporations are finding new useful and cost-effective ways to sustain productivity and reduce any possible negative impacts that the use of pesticides has on their products, plants, water, soil, workers, nearby communities and the environment.

Table 6: MoUs signed with agricultural companies - BMPS

Chiquita	Signed in July 2005. In coordination with WWF, Chiquita is implementing the <i>Pesticide Environmental Assessment System (PEAS)</i> , which is an important step in the measuring standardization, control practices and the subsequent reduction of negative
-----------------	---

	effects pesticides could have on the banana production and process.
Dole	Signed in April 2006. In coordination with WWF, Dole is finding new and cost-effective ways to sustain productivity, reducing negative impacts of pesticides on their products, plants, water, soil, workers, nearby communities and the environment. A toxicology units program is being implemented as a first element in the consolidation of WWF's Better Management Practices project in the MAR. The main goal of the program is to reduce pesticide exposure levels for agriculture workers of class 1 and 2 agrochemicals (classified by the human health risk level), which are the most toxic substances. In addition, research is underway to measure soil erosion and the benefits of BMPs to retain the soil from commercial pineapple fields.
Fyffes	To be signed. The draft MOU with Fyffes has been reviewed and approved by this company. Through this relationship, Fyffes and WWF are implementing the Pesticide Environmental Assessment System, aimed at reducing the most toxic pesticides used in banana production, specifically in Belize.
Sugarcane Growers Association in Chetumal Bay, Mexic	The Local Union of Sugarcane Producers ULPCA-CNC and the Civil Association of Sugarcane Producers from the Río Hondo watershed (ACCPCA) from Chetumal Bay, Mexico, in collaboration with WWF are implementing a program to control one of their major sugarcane pests: the sugarcane fly (<i>Aeneolamia postica</i> , Walker) with biological control through the fungus <i>Metarhizium anisopliae</i> . The main purpose of this project is to cut down the insecticides use and reduce the toxicology budget.
Sugarcane Growers Association in Stann Creek and Corozal Districts, Belize	Signed June 26 th 2007. The Belize Cane Farmers Association - Orange Walk and Corozal Divisions from the Rio Hondo watershed, in collaboration with WWF, are implementing a program to control one of their major sugarcane pests: the sugarcane fly (<i>Aeneolamia postica</i> , Walker) with control through the use of the fungus <i>Metarhizium anisopliae</i> . The main purpose of this project is to reduce insecticide use; at present, four demonstrative plots have been established in order to show growers the benefits and advantages the biological control has over conventional Sugarcane fly chemical control from de agronomical and financial perspective.
Citrus Growers Association – Belize	Officially signed July 3 rd 2007. The Citrus Grower Association Officers have started implementing cover crops as means of reducing herbicide use and reducing soil erosion.
FHIA	WWF also signed an MOU with FHIA, an institution which has a long experience in agriculture practices, GIS systems and research. The purpose of the agreement is to consolidate the partnership between both organizations and strengthen joint scientific and research capabilities to promote agriculture BMPs in the region
ACISON	Signed December 5 th 2006. MOU with The Association of Citrus Producer of Sonaguera (ACISON) in Honduras, to jointly work in reducing the environmental impact of citrus production on the MAR. This association includes more than 1,000 citrus producers who, through this program may be implementing Better Management Practices in their plantations. In 2007, WWF, ACISON, and FHIA are working together in implementing the project “ EVALUATION OF LIVE GROUND COVERS AS A BETTER MANAGEMENT PRACTICE TO CONTROL WEEDS AND REDUCE SOIL EROSION IN CITRUS PLANTATIONS IN THE AGUAN RIVER BASIN, HONDURAS ”.
AZUNOSA	Singed December 6 th 2006. MOU with <i>Azucarera del Norte S.A.</i> , a SabMiller's subsidiary and one of the major sugarcane producers in Northern Honduras. They are starting to implement Better Management Practices in their plantations and processing plants, which will translate into an important benefit for the Mesoamerican Reef ecoregion and the nearby communities. At present, WWF and AZUNOSA are also implementing the Pesticide Environmental Assessment System (PEAS). They are also participating in the sugarcane fly biological pest control program to reduce insecticide use
PALSA /AGROTOR	Signed June 19 th 2007. MoU with <i>Palmas de San Alejo</i> and <i>Agropecuaria Tornabé</i> , the second biggest oil palm producer in Northern Honduras. Agreement to start a joint

project “ EVALUATION OF LIVE GROUND COVERS AS A BETTER MANAGEMENT PRACTICE TO CONTROL WEEDS, TO REDUCE HERBICIDE USE, AND REDUCE FERTILIZER APPLICATIONS IN OIL PALM PLANTATIONS IN THE ATLANTIC REGION OF HONDURAS ”. In addition, work will be carried out in the processing plant, where most of the bulk disposal comes from. At present, WWF and AGROTOR are working together on a project to capture greenhouse gas emissions from the sedimentation and evaporation ponds.
--

Governments have also been engaged in the process of promoting implementation of BMPs to guarantee continuation of activities after the life of the project. There is interest from the Ministry of Agriculture and Livestock and the Ministry of Natural Resources and the Environment of Honduras to agree upon language of MoUs for mutual collaboration with WWF. The former administration had agreed on a language for an agreement (See Annex 5); WWF is now in conversations with the new administration to revive this process.

2) Documenting the environmental impacts of agricultural industries - Monitoring

Documenting the environmental impacts of agricultural industries has been pursued by monitoring bioaccumulation levels in marine organisms, thus evaluating the overall toxicity of the agrochemicals in use, and identifying and understanding the financial impacts of the better management practices that measurably reduce those impacts. Through this approach, WWF made significant achievements that started with the support of the ICRAN-MAR alliance and that will continue beyond the life of the project.

- Monitoring toxic bio-accumulation: A Contaminant Monitoring Protocol was developed with co-funding from the Summit Foundation. See Annex 4. WWF completed four rounds of sample collection and testing for bioaccumulation of agrochemicals in marine organisms in the Mesoamerican Reef. This monitoring is still ongoing and will continue at selected sites in Belize, Bay Islands in Honduras, and the Chetumal Bay, Mexico. Samples were collected and analyzed using the Contaminants Monitoring and Lab Analysis protocols.

These internationally vetted protocols for sampling and lab analysis are being used by WWF for bioaccumulation assessments in the Coral Triangle, the Amazon, the Gulf of California, East Africa Marine, and the Mekong. In addition, the EPA and NOAA have adapted the WWF protocols for water quality monitoring in Hurricane Katrina-affected areas and the Government of New Zealand has adopted the protocols as the official standards for bioaccumulation sampling and lab analysis for the country. The results are in discussion with the agroindustry to set a base line to target the most common and toxic agrochemicals accumulated in the MAR.

- Pesticide Environmental Assessment System (PEAS): In July 2006, WWF and Benbrook and Associates² met with environmental affairs personnel from two of the major banana producing companies in the world – Chiquita Brands Inc. and Dole Food Company – to discuss the implementation of better management practices in their production processes. These BMPs will, over the long-term, have favorable social, economic and environmental impacts in the region where they operate³. In coordination with WWF, these corporations are finding new, useful and cost-effective ways to sustain productivity and reduce negative impacts that the use of pesticides has on their products, plants, water, soil, workers, nearby communities, and the environment more generally.

² Dr. Chuck Benbrook and Associates: area specialists in Analytical Chemistry and toxicology protocols development in the US; with more than 10 years in experience.

³ The meetings had to be held separately because of recent conflicts between the two companies.

A goal of WWF's work in the MAR is to develop toxicology budgets for each of the major industries where agrochemicals are key issues. Once the budgets are developed, WWF will work with key producers and producer associations to identify and adopt the BMPs that reduce overall impacts on the MAR to more acceptable levels. The main goal of the program is to reduce pesticide exposure levels for the environment and agriculture workers of Type I and II agrochemicals, which are the most toxic substances for humans and the environment. The execution of the PEAS is an important step in the standardization of measurements, control practices, and the reduction of the negative effects pesticides (e.g. monitoring and reducing Chlorothalonil and Mancozeb) might have on either production or consumption.

In December 2006, Benbrook and Associates delivered the first draft of the banana and pineapple toxicity factors and rankings. While some aspects of the study remain unclear, WWF expects to quickly resolve these issues and to finalize the results by the end of the year. The findings will be compiled into materials that report on the multi-attribute quantifications and rankings, and explain the basis for each of the individual indices, the rankings within indices, and the equations and data sources for the rankings. Once this information is finalized, WWF will begin to assess trends and identify risk factors as they relate to overall toxicity.

In terms of aquatic organisms, a need still exists for development of better indicators to assess impacts of toxicity on key coral reef species. However, as these indicators would not be likely to significantly change the overall outcome of the work, WWF plans to start almost immediately to reduce use and risk from more toxic chemicals. Fortunately, nearly all of the identified risk drivers are among those that the companies are already phasing out (or have completely phased out), primarily for worker or ecological reasons.

3) Establish baselines for key impacts (e.g. soil erosion) and determine the impact of Better Management Practices (BMPs) in reducing those impacts to acceptable levels.

- Inventory of plantations and environmental impact assessment for the MAR watersheds. Using satellite images and other GIS tools, including the results from the Watershed Analysis carried out by partners WRI and WCMC, WWF has determined the type, extension, associated soil loss and other key information to facilitate the selection of the areas, crops and stakeholders to work with, to target key agricultural practices to reduce coastal water pollution and sedimentation in the MAR.
- Monitoring program with sugarcane growers to gather data on pesticide usage in Honduras: Working with *Azucarera del Norte, S.A. (AZUNOSA)*, WWF completed data gathering on usage of Glyphosate, 2-4,D, Paraquat, Deltamethrin, Malathion, Fipronil, and Imidacloprid. WWF began developing an environmental management plan to address major issues such as residue management, emissions control, and water treatment among other issues. A monitoring program was established to measure improvements and has been in full operation since July 2006. To date, draft tables have been developed and preliminary responsible persons have been identified.
- Biological control as a way to reduce the impact of pesticides in the MAR: As part of the deployment of BMPs, and with the sponsorship of the Summit Foundation, ICRAN-MAR, and CropLife Latin America, WWF has implemented the biological control of the Froghopper *Aeneolamia postica Walker Homopterous: Cercopidae*, in sugarcane fields in Chetumal Bay, Mexico, Belize, and Northern Honduras. This practice by itself will reduce the use of pesticides by 30% and reduce the cost of controlling the pest by 50 percent.

- Cover crops as a means to reduce pesticide use and reduce soil erosion in Belize: WWF implemented a pilot project with the Citrus Growers Association (CGA) in Belize with the aim to reduce herbicide pollution and sedimentation from Belizean citrus production. The Citrus Research and Education Institute (CREI) in Belize, is partnering with WWF implementing a pilot project to reduce herbicide pollution and sedimentation from Belizean citrus production. The project focuses on improving knowledge of environmentally and economically beneficial weed management practices in Belizean citrus, educating farmers about the environmental and economic benefits of alternative weed management, and providing resources for growers to establish cover crops cultures.
- Evaluation of Cover Crops in Citrus Plantations in Honduras: WWF implemented the project: “Evaluation of live ground covers as a Better Management Practice to control weeds and reduce soil erosion in citrus plantations in The Aguan River Basin, Honduras.” This project will help ACISON reduce the negative effects of herbicides used for weed control in citrus plantations on the soils, water sources, and the coral reef of the MAR area. Using the results, WWF expects to improve growers’ knowledge in the benefits of integrated weed control (IWC): reduced environmental impact by minimized use of herbicides; decreased soil erosion and surface and groundwater contamination; reduced weed control costs; and increased and optimized effectiveness of weed control.
- Sugarcane management practices and their environmental impact in Orange Walk and Corozal Districts in Belize: With co-funding from CropLife Latin America, WWF identified current management practices for sugarcane production and their environmental impact in these Belizean Districts. A set of recommendations was given to improve management practices within the sugarcane production processes to reduce the overall pollution of coastal waters. The sugarcane industry, unlike the citrus industry, will require significant and immediate assistance from WWF to succeed in promoting BMPs and reducing the overall pollution of coastal waters. Empowering the Board of Directors in the decision making process for technical matters is a high priority.
- Sugarcane management practices and their environmental impact in Chetumal Bay, Quintana Roo, Mexico: With co-funding from CropLife Latin America, WWF also identified current management practices for sugarcane production and their environmental impact in this area. The sugarcane industry in Chetumal Bay, Mexico, unlike their counterpart in Belize, is performing better in regards of reducing the risk of contamination. Their biological control of a major sugarcane pest has reduced the use of harmful pesticides.
- Climatic and soil monitoring system in MAR agricultural areas in Belize and Honduras: To complement and promote long-term sustainability of project results, and with co-financing from Summit Foundation WWF has established the project “Climatic and Soil Monitoring System in the MAR Agricultural Areas” by which WWF will monitor⁴ soil erosion and weather parameters in sugarcane, oil palm, and citrus plantations in Belize and Honduras. State of the art GSM-GPRS telemetric real-time weather stations (WS) and Soil Cohesive Meter (SCM)⁵ have been purchased from cutting edge precision companies from Austria and England. Weather Stations will be configured to collect and deliver weather data to the PANDA server at La Lima’s (Honduras) WWF Linux OS. WWF has already begun installing four monitoring stations in the following locations:

⁴ Implementation of the climatic and soil monitoring system program has already started with the Citrus Growers Association (CGA) from Belize, the Citrus Growers Association in Honduras, the Sugarcane Growers association in Belize, and oil palm in Honduras.

⁵ Measures soil cohesive strength as an indication of erosivity under different agricultural practices

- Stann Creek District, Belize - the Citrus Growers Association's citrus fields.
- Orange Walk District, Belize - the Sugarcane Growers Association's sugar cane fields.
- Sonaguera, Colón, Honduras within the Citrus Growers Association's citrus field.
- Tela, Atlántida, Honduras at PALSA/AGROTOR, to monitor weather parameters in oil palm plantations..

Results will help to identify sites with high erosivity indexes and will complement WRI's Watershed Analysis work; thus, soil BMPs can be deployed to reduce erosion and anticipate to potential erosion.

Data will be graphically displayed using GIS mapping technologies and erosive risk-maps that will help to monitor, on a timely basis, the effect of implemented soil BMPs through the MAR and collected information will be processed and analyzed using specialized software and distributed widely through the developing Web site: www.wwf-mar.org.

Intermediate steps/activities for achieving major outputs 1) – 3) included:

- Conducting an inventory of commercial crops produced in the MAR region to identify key agribusinesses and seek their collaboration through the signing of agreements to work together in reducing agrochemical contamination of the MAR.
- Gathering information about areas of production, agricultural production cycles, and identifying the agricultural threats –and main sources of pollution– that are most damaging to the health and integrity of the MAR.
- Conducting an inventory of agricultural practices carried out by the major agroindustry players and identifying better -and worst- management practices as well as producers who already implemented better practices. Collecting information on existing and proven BMPs, such as the biological control of the frog hopper in sugarcane crops.
- Convening a series of meetings and workshops with major agricultural producers to establish relationships and build trust. Meetings were held separately for each commodity because of confidentiality issues and property rights. Likewise, WWF attended on-going producer group meetings in addition to face-to-face meetings with innovators, influential individuals that needed to be brought into the process in order to facilitate the dissemination of BMPs by producers.
- Starting monitoring bioaccumulation of agrochemicals in marine life of the MAR. Preliminary results proved agribusinesses were indeed contributing, and agrochemicals were linked to specific agroindustries such as bananas, sugarcane, citrus, pineapples, and palm oil. Data on agrochemicals being used was obtained from larger companies (Dole, Chiquita, and Fyffes) based on good relationships with WWF.
- Developing measurable soil and water standards. An Ecotoxicology workshop was organized in April 2005 to assist with development and implementation of monitoring programs. Ecotoxicology experts from the leading regional agro-industry enterprises and from the transnational agro chemical-production companies discussed protocols for pesticide monitoring in reef organisms. As a result of these consultations, the protocol for pesticide monitoring in reef organisms was designed and produced.
- Participation at the Tulum+8 consultations, promoting agriculture meeting where different agribusiness exchanged information about their management practices.

Focus by country:

- Mexico (Chetumal Bay) – sugarcane. WWF brought the two sugarcane growers associations and the sugar mill on board.
- Belize – sugarcane and citrus. Partners are working with the two sugarcane growers associations from Northern Belize and the Citrus growers association in the South.
- Honduras – pineapple, citrus, banana, sugarcane, and palm oil. Dole, Chiquita (bananas and pineapple), and the citrus, the sugarcane, and the palm oil industries have signed collaborative agreements.
- Guatemala – banana. Dole and Chiquita are engaged.

B) SCOPE OF RESULTS/IMPACTS – RELEVANCE OF OUTPUTS TO THE REGION

The ICRAN-MAR project has generated several BMP's handbooks and on-line tools to address strategic decision-making based in the localization, crop abundance, and watershed relationship. It has made possible to develop and implement a comprehensive Agricultural Better Management Practices program under the concept of system approach, while working each component with managers, farm operators, local and national authorities, and other industries and services. The documents and written reports were developed seeking collaboration within the agroindustries and have been carefully custom tailored.

As already mentioned, activities under this sub-component will continue beyond the life of the ICRAN-MAR project with leveraged funding sources. Results achieved to date provide evidence of the relevance of conducting this work for the benefit of the MAR:

- **Bioaccumulation monitoring.** Acknowledges that agrochemical bioaccumulation occurs in marine organisms and that this imposes potential harms in the different ecosystems' life chains.
- **Signature of MoUs.** Speaks of the industry's willingness to participate in actions that can lower their impact on the environment while maintaining their economical benefits.

"We are always looking for ways to improve our management practices from the environmental and legal standpoints... We accepted WWF's invitation to join forces and look for alternatives for improvement of field practices to maintain or increase productivity while reducing environmental contamination risk... Joint efforts will be directed to capture gas emissions from our oxidation ponds to produce electricity and reduce dependence on fossil fuel. We will implement cover crops on the field to reduce herbicide and nitrogen applications as well as to reduce soil erosion." Danny Gabrie, Vice-president of Agro industrial Operations of Jaremar Group (PALSA/AGROTOR)

"The alliance with WWF will facilitate work in the search of viable and profitable solutions to improve productivity and it will allow producers to reduce any possible negative impact that pesticide use has on their product, plants, water, soil, workers, nearby communities, and the environment. The implementation of the evaluation of the cover crops project in citrus production will allow us to reduce weed control costs, preserve the soil and, of course, decrease the use of herbicides and their impact on the environment. As citrus producers we need to take the lead, create conscience and begin to work in a more environmentally friendly way". Engineer Selmy Mejía, President of ACISON.

“Our company begins this program with a lot of enthusiasm and committed to obtaining results in a short period. The most effective and responsible way of doing business is by contributing to the society in which we operate, creating job opportunities, taxes for public services, and protecting the environment. Working with WWF will be a beneficial experience for Honduras and for our region.”
Engineer Mario Hernández General Manager, AZUNOSA

Nahum Fuentes, Chairman of the “Asociación Civil de Productores de Caña” (ACPC) was very emphatic in the role that WWF as part of the ICRAN-MAR project is playing in promoting better management practices among sugarcane growers from Belize and Quintana Roo, Mexico. He highlighted the support that the Sugar Cane Production Committee of San Rafael de Pucte Sugar Factory is willing to provide Belize cane growers for the biological control measure. He mentioned that seven years ago the Chetumal sugar sector was using a lot of chemical products with a negative environment impact and high costs to the farmers’ economy; they were worried when the population of various species of birds, which fed on the poisoned insects, was almost nil and the cane fly control cost was almost US \$300,000 per year.

- **Leveraged funding and support.** Speak of the interest by other donors and the private sector to invest in efforts that promote the health the MAR by supporting research, information gathering, and consolidating mechanisms in support of adoption of better agricultural practices.
- **Government involvement.** The fact that government officials from Belize have started following the biological control of the cane fly in sugarcane fields⁶ and that the Honduran Ministers have expressed their interest to commit to these efforts, speak of the relevance of the project to the development priorities of the region.

This innovative work combining bioaccumulation testing with actual field work in promoting sound and cost effective better management practices has allowed WWF to raise the profile of the ICRAN-MAR project in the region. The agriculture work done to date has created the basis for deploying BMPs with the potential to reduce pesticides use by commercial agriculture and therefore to reduce contamination threats to the MAR. Agroindustry producers from Chetumal Bay, Mexico, Belize, Guatemala, and Honduras partnering with the project have now a much better understanding about environmental protection, specifically with regards to pesticide use in their production processes.

The fact that this is a voluntary-led process generates sympathy among NGOs, governments, and agroindustries. The approach taken by the ICRAN-MAR Project to gather their collaboration has been well taken by agroindustries. They are convinced that by participating voluntarily the project will achieve measurable results on the ground. The ICRAN-MAR project is building capacity among agriculture producers with regards to environmental awareness, and at the same time, key producers from the different agroindustries are telling the story among themselves, which translates into a good communication and outreach.

Project partners see a significant impact already created by the program in Mexico, Belize, and Honduras, and to a lesser extent in Guatemala⁷. On the long run this impact will be measured

⁶ Orange Walk and Corozal, Northern Belize

⁷ As determined during project design and established in the Project Document. A greater percentage of activities would take place in the other 3 countries, whose coasts over the Caribbean are larger.

in the field utilizing baseline data already compiled by WWF and comparing it with changes in agrochemical use from Dole, Fyffes, and Chiquita's crops. With time, implementation of Better Management Practices to reduce pesticide use will translate into a greater benefit for the Mesoamerican Reef ecoregion and for the nearby communities –and workers – that not only profit from this activity, but who are continuously exposed to agrochemicals.

Watershed Analysis and modeling

Sub-result 1. 2. *Trends in land use integrated with spatial, hydrological and oceanographic models with strengthened capacity within the region for spatial analysis and scenario building activities, and*

Sub-result 1.3. *Scientific information and modeling results used to influence decision-makers regarding land-use policies in order to decrease threats to coral reefs of the MAR.*

A) MAJOR OUTPUTS:

Activities under these two sub-results provided the basis for a **comprehensive watershed analysis for the Mesoamerican Reef** that was released by WRI (data CD and analysis) providing significant insights on the connections between land-based sources of threat and impacts to the MAR. This analysis tool works at many scales and allows identification and prioritization of the sub-basins which contribute the most sediment and nutrients to coastal waters along the MAR⁸.

Steps to produce this watershed analysis included the following intermediate results and milestones:

- Definition of all watersheds (400) of at least 5 sq km discharging along the MAR. These were developed by WRI, reviewed and revised several times with collaboration from regional experts. Basins were delineated from 90m resolution NASA SRTM.
- Predictions of future patterns of land cover changes and development of scenarios for the MAR. This activity was led by UNEP-WCMC and specific outputs were utilized to feed some of the hydrologic model analysis conducted by WRI. Please refer to Annual report 2005-2006 for more details about the methodology, and to Annex 6 for a full technical report on *Land use change modeling for three scenarios for the MAR region*.
- A seamless land cover dataset was finalized in GIS raster format for use in the statistical analysis and by the CLUE S land use change model and N-SPECT hydrology model. This dataset was developed from several land cover datasets that were identified as the most accurate and up to date, and the data was then reclassified into 10 land use classes. The dataset went through three revisions and was reviewed by all project partners at UNEP-WCMC and WRI.
- Development and validation of the CLUE-S land-use change model originally developed in Utrecht University (Netherlands) and adapted for this project. Final results for the four countries and the three scenarios were presented at a project watershed management workshop in August 2006.

⁸ A full detailed report on the methodology and results, can be found in the "*Watershed Analysis for the Mesoamerican Reef*" data CD prepared by WRI. Contains metadata that is also available through the SERVIR portal. Report is available online through www.icranmar.org and reefsatrisk.wri.org and presented as Annex 9 of this report

- Using land cover scenario data produced by WCMC, WRI performed a hydrologic and spatial analysis of impact of land-cover change on erosion and sediment delivery, using the Non-point-Source Pollution and Erosion Comparison Tool (N-SPECT) model developed by NOAA. This public domain tool was selected in the spirit of cooperation and collaboration with other projects; the MBRS project was using it for its trans-boundary study.
- WRI in collaboration with UNEP-WCMC and WWF, calibrated models to predict impacts of land cover change. WWF reviewed model results and provided leads for data for calibration. WRI did the calibration in collaboration with Texas A&M University.
- WRI in collaboration with UNEP-WCMC and WWF, estimated dispersion of sediment and nutrients along the MAR. WRI managed a subgrant with University of Miami to implement a circulation model. WWF reviewed circulation model results.
- WRI produced the Belize Coastal Atlas, a rich data product that includes GIS data, metadata, reports, and maps of threats to coral reefs in Belize and for all of the Mesoamerican Reef. See Annex 7.
- Under the leadership of UNEP-WCMC and contribution from WRI, a collaborative network and a workshop were organized to evaluate scenarios of land cover change and impacts on coastal ecosystems.
- The watershed management workshop was successfully held in August 2006 at Galen University in Belize. The workshop comprised 1.5 days oriented to policy-makers (40 participants), and 2.5 days of technical training in the use of the CLUE-S and NSPECT models (25 participants). Significant inputs and feedback were obtained from regional experts participating at this event. Information provided by these stakeholders allowed for further validation and calibration of model results.
- Both sessions provided a great opportunity for national specialists to acquire new technological knowledge, coordinate activities, plan their modeling efforts, exchange experiences with colleagues from other countries, and acquire geospatial information developed by the ICRAN-MAR. In feedback provided at the workshop, numerous possible applications of project outputs were identified (e.g. overall land use planning, reporting to UNFCCC). Various potential improvements to datasets and methods were identified, and enthusiasm expressed for potential take-up and adaptation of the models involved. Workshop proceedings can be found in Annex 8⁹ of this report.
- Collaboration between WCMC and WRI for additional training and capacity building in the region, including the translation into Spanish of N-SPECT watershed management software manual and tutorial, and the support to two participants from *Universidad Autonoma de Honduras* to undertake N-SPECT training at a 3 day workshop held at WRI's offices in Washington DC, USA.

B) SCOPE OF RESULTS/IMPACTS – RELEVANCE OF OUTPUTS TO THE REGION

This hydrologic analysis serves to integrate a wide range of data, and adapt modeling tools for an innovative, region-wide analysis for the MAR. The region-wide results presented in this analysis *should be considered preliminary and indicative of the overall pattern and magnitude of erosion and nutrient and sediment delivery across the region*. A detailed report of key findings can be found in Annex 9¹⁰ of this report; mayor findings include:

⁹ Proceedings available online in English and Spanish, through www.icranmar.org, and www.unep-wcmc.org/assessments/mar

¹⁰ Summary report available online in English and Spanish through www.icranmar.org, and reefsatrisk.wri.org

The origin of sediments and nutrients reaching the MAR:

- Of the 400 watersheds in the MAR region, the Ulua watershed in Honduras was found to be the largest contributor of sediment, nitrogen, and phosphorous.
- It is estimated that over 80% of sediment and over half of all nutrients (both nitrogen and phosphorous) originate in Honduras.
- The modeling suggests that compared to the other countries, relatively minor percentages of the regional sediment load come from Belize and Mexico
- Guatemala was identified as a source of about one-sixth of all sediments and about one-quarter of all nitrogen and phosphorous entering coastal waters along the MAR

Runoff, erosion, and nutrient delivery to coastal waters are increasing:

- As a result of human alteration of the landscape, runoff and associated river discharge at river mouths has nearly doubled; sediment delivery at river mouths has increased by a factor of 20; nitrogen delivery has increased by a factor of 3, and phosphorous delivery by a factor of 7. (Ratios are based on model results for current (2003/04) land cover and on hypothetical natural (unaltered) land cover.

The potential impacts of development and land-use paths are varied:

- Under land-use scenarios which favor free markets and little policy regarding the environment, nutrient delivery is likely to increase by about 10% by 2025, while sediment delivery might increase by 13% or more.
- If environmental policies that favor sustainable development are implemented, nutrient and sediment delivery are likely to be reduced by at least 5% from current levels, fostering recovery of degraded corals.
- Implementation of better agricultural management practices will yield additional reductions in sediment and nutrient delivery beyond those evaluated in this study, which has focused on the effect of changes in land cover

Results of this analysis show that relevant policy action at a national level to address the contributions from agricultural lands in the region needs to be supported. These results can help identify areas in need of better agricultural management, as the analysis identifies vulnerable areas where conversion to an erosive land use should be avoided, or where converted conservation practices should be implemented. The analysis also identifies areas with high erosion and nutrient runoff, where better agricultural management practices should be targeted. In fact, throughout the project, WWF has used the analysis results to target interventions on improved agricultural management.

With regard to land use planning, the results also suggest that policies that support sustainable development can reduce sediment and nutrient delivery, thereby decreasing sediment and nutrients reaching the MAR.

The final results have been disseminated widely to government and non-government organizations in the region and several government agencies are planning to do more detailed local analyses using the tools provided on the data CD. The Hydrology-Meteorology Department of Belize has highlighted the relevance of these tools for several in-country applications, and – understanding the logical limitations of the models – their potential to be

used to inform in the preparation of a water management bill to establish a water commission for the country¹¹.

An important aspect of the project is the transferring of these modeling tools to partners in the MAR region so that they might apply them at higher resolution to produce more detailed results for smaller areas within the MAR region. This has been done by means of the watershed workshop and subsequent communications with interested parties, such as the Meteorological Department in Belize, INEGI and CONANP in Mexico. Most recently (June-July 2007), Honduran scientists from *Universidad Autonoma de Honduras* were trained in the use of the N-SPECT methodology; this meeting enabled the Honduran GIS experts to meet and plan work together with a Redlands Institute/University of Redlands postgraduate student, who is studying soil loss in a group of watersheds draining into the northern coast of Honduras. This collaboration yielded a plan for follow-up activity on possible data sources and cooperation. This overall approach will allow for refinement and better calibration of the model to local circumstances within the region by the institutions interested in the utility of these tools.

C) CAPACITY BUILDING

Capacity building has been a fundamental element of this component. Project's efforts are extremely relevant to national capacity building, particularly in Belize where significant impacts were realized through the presence of a committed UNEP-WCMC contractor in the earlier stages of the project. UNEP-WCMC initially subcontracted some of its work to a government agency in Belize, the Coastal Zone Management Authority and Institute (CZMAI). While the CZMAI has possessed spatial analytical capacity for the past decade, the work with the ICRAN-MAR continued to maintain human capacity by funding staff, and also strengthened capacity through continuous transfer of analytical methods and data. In addition, the local subcontractor spent significant time informally instructing personnel from a number of institutions in various aspects of spatial analysis and information management, and in sharing data. These institutions include Galen University, the University of Belize, the Fisheries Department, the Forest Department, the Belize Audubon Society, and the Land Information Centre, among others¹².

In 2005, the local UNEP-WCMC subcontractor engaged an electronic forum of Belizean spatial analysts seeking to both (a) repatriate crucial spatial data from foreign (mainly U.K.-based) sources such as the Ordnance Survey and Natural Resources Institute, and (b) continue to build capacity in the form of the national spatial data infrastructure. To this end, he played a key role in the organization of the first-ever Geographic Information Systems Day in Belize, an event celebrated annually around the world since 1987 that took place for the first time on November 16, 2005 at the campus of Galen University.

Unfortunately, the analyst attached to CZMAI resigned in December 2005, meaning that the implementation of these local capacity building functions for the remainder of the project had to be redeployed elsewhere. However, the analyst is now working for the SERVIR Mesostor initiative at CATHALAC (Water Center for the Humid Tropics of Latin America and the Caribbean), and he has been of great help in ensuring that ICRAN MAR project outputs will be represented on this data portal. An ongoing cordial relationship has fostered links between the project and the broader Mesoamerican region; he attended the project workshop in August

¹¹ Ramon Frutos, Hydrology-Meteorology Department of Belize; intervention at the CD launch event, December 12, 2006, Radisson Hotel, Belize City

¹² See Annex 1 for more institutions

2006, both assisting in facilitation and providing an implementation of NASA's WorldWind software.

In addition to the above, the project also transferred data and analytical methodologies to the countries of the MAR through continued engagement of professionals in the region, and the coordination of the regional watershed management workshop held in August 2006. At the workshop 25 regional experts were trained and there was much interest for further training and in-country and long-distance support. As a result, UNEP-WCMC requested an extension of their implementation period until June 30 2007 to allow further interaction with users of the project outputs and models and promote more capacity building. .

D) INFORMATION DISSEMINATION

All project results have been made available to the wider public through final technical project reports, internet sites, and data CD. These resources can be found at:

- ICRAN-MAR project website. www.icranmar.org
- Project summary reports and maps. Reefs at Risk. reefsatrisk.wri.org
- Workshop proceedings; pdfs of presentations given at the workshop; technical document on Land use change modeling for three scenarios for the MAR region. See: <http://www.unep-wcmc.org/assessments/mar>.
- An electronic e-mail group was established to facilitate communication amongst regional partners using the land use and hydrology models for which training was provided at the August 2006 workshop. See: <http://groups.google.com/group/mar-watersheds>
- Maps prepared by the WCMC focal point in Belize in preparation for consultation with local (i.e. Belize) land use experts concerning the land use scenarios. See: www.biodiversity.bz
 - Comparison of national mangrove cover data for 1992 and 2004, showing areas cleared for coastal development in that period (surprisingly only 3,600 acres cleared in the 12-year period):
http://www.biodiversity.bz/downloads/bz_mangrove_clearing_1992-04.pdf
 - Comparison of the 90m SRTM-derived slope data with that of our national soil / terrain mapping project, conducted by U.K. Overseas Development Administration between 1986 and 1992: http://www.biodiversity.bz/downloads/bz_slope_maps_comparison.pdf
 - Land cleared as of the period 1989-90-92 (from Belize's first national land use mapping project), showing 0.5 million acres (of 5.6 million acres) of converted lands:
http://www.biodiversity.bz/downloads/bz_devt_1989-90-92.pdf
 - Land cleared as of 2004 (the most recent national land use data available), showing over 1 million acres of converted lands:
http://www.biodiversity.bz/downloads/bz_devt_2004.pdf
- GIS data are available online via the SERVIR web site at <http://servir.nasa.cathalac.org> or <http://servir.nsstc.nasa.gov>

4. Impacts and the Larger Scale – Leveraged Support – The Way Ahead

Partnerships with agribusiness

The agricultural work the ICRAN-MAR Alliance supports in the region under the leadership of WWF has proven to be innovative and is setting the basis for a solid long-term program that will benefit the Mesoamerican region. Evidence suggests there is interest and potential to replicate project strategies in other areas of the region and beyond.

- **Leveraged support**¹³. Financial support from other institutions has been leveraged to complement project activities and allowing consolidation of project results. Summit Foundation committed resources in support of bioaccumulation studies, monitoring and consolidation of BMPs. CropLife – Latin America made a pledge to contribute with funds to enhance the scientific base to demonstrate the persistence and the impacts of agrochemicals in the MAR. The fact that this additional support has been leveraged speaks of the relevance of this work for the benefit of the region. Their support to these efforts is strengthening and paving the way for the continuation and sustainability of this work beyond the life of the ICRAN-MAR project. However, CropLife’s contribution came to an end in 2007 and there is need to seek additional funding.
- **Beyond project original activities.** The original project goal of identifying agricultural threats led to the development of an agrochemical monitoring protocol that is now being used in other regions of the world. The development and execution of the Toxicology Units Program supported by Summit constitutes a significant element in the consolidation of the Better Management Practices project that WWF carries out in the MAR.
- **Filling gaps.** The project has filled gaps that Agriculture Departments in the countries have not fully addressed in the past. Through the ICRAN-MAR project Belizean and Mexican sugarcane growers are having the opportunity to improve their production techniques while producing sugar in a more environmental and economical sustainable way. Other examples include the cover crop projects in Belize and Honduras.
- **Developing marketing linkages.** WWF started influencing key investors in the region to improve their enterprises with the concept of BMP-based production. A clear example of this influence is the relationship that WWF-US developed with SabMiller (The CocaCola Company), which decided that its key sugarcane producer in Central America (AZUNOSA) signed a collaborative agreement with WWF to work together on BMPs.
- **Convening the industry.** Complementing local bioaccumulation studies, WWF has managed to convene a pesticide roundtable with producers, buyers, and chemical manufacturers to better understand and reduce overall agricultural toxicity in marine areas. Program officials are serving as advisors to DuPont, Monsanto and CropLife with regard to agrochemical and GMO issues. In short, partners are laying the groundwork to bring industry to the table for discussions of key issues that are being more sharply defined. While the roundtable did not occur in 2007, progress was made toward this goal in terms of specifically defining the issue and potential ways of moving forward.
- **Application of project results.** The monitoring protocol has been used by NOAA in the monitoring of contamination after Katrina’s hurricane in New Orleans, US. In addition, it has been adopted by the New Zealand government to monitor contamination of their reefs. These high quality publications are being used not only by governments, but also by private institutions for implementing their own programs and monitoring. The set of studies has contributed greatly as a base for other programs. In addition the monitoring protocol and network is a very important step to consolidate a knowledge base-line to measure the future impacts of conservation projects over the reef.

¹³ See Table 1 in the executive summary for more information

- **Potential for replication.** Activities and results under the ICRAN-MAR project have been very well received and commended within the international WWF organization, so much that top management wants to implement it in other parts of the world.
- **Catalytic effects in the region.** With the signature of MoUs with Dole and Chiquita for the implementation of better management practices in their banana and pineapple operations, it is hoped that other banana, pineapple, citrus, palm oil, and sugarcane producers located in the Mesoamerican Reef territory will join the initiative and implement BMPs in their production processes.
- **Changes in national laws and regulations.** Due to the formal adoption of the Central America Free Trade Agreement (CAFTA), and the anticipated influence in the crop distribution and pesticides use, WWF supported a research study named “Analysis of the CAFTA impact in the importation and use of pesticides in the MAR Watersheds”. This activity began in Guatemala in June 2006 and its goal was to identify possible changes in crops and pesticides use, determine the new pesticide use regulatory requirements under CAFTA, and forecast the possible environmental impacts due to anticipated changes in pesticides use. Initial results have shown that the CAFTA will not affect the extension of the 5 most important crops in the Motagua and Polochic Watersheds; nevertheless it is expected that the oil palm will duplicate the cropped area in the next 5 years, due to market drivers. In addition, other crops as watermelon can be a primary threat in the Motagua basin (report available upon request).
- **Strengthening scientific base.** The partnership (MoU) with FHIA is of great relevance for the strengthening of joint scientific and research capabilities to promote agriculture BMPs in the region. FHIA started the project “Citrus Producers in the Aguán River Basin, and Palm Oil Producers in the Coastal Plains of Department of Atlántida, Honduras” which will develop the baseline information for the long term monitoring of the environmental impacts caused by this industry in the Aguán River Basin area and nearby marine ecosystems. This project will complement some of WWF’s strategy in agriculture by: a) developing a citrus producers data base, b) establishing a citrus grower working group based on the MoU already signed with WWF – whereby the industry is committed to implementing sustainable citrus production practices – and, c) developing a citrus threats analysis, a geo-referenced map and a preliminary report of recommended local better management practices.
- **Improving communication and information exchange.** Communication between industries within countries and industries among countries has improved. As a result, different BMPs among countries can be shared and there is interest in doing so. Sugarcane growers from Mexico –who are the leaders in biological control of insects– are sharing this information with Belizean and Honduran sugarcane growers. The Sugar Mill officers from San Rafael de Pucte, Quintana Roo, Mexico, provided AZUNOSA in Honduras with blueprints and production costs for the construction of a laboratory for the production of *Metarhizium spp.* There is potential for continuation of information exchange.

Watershed Analysis and modeling

Through the development of these activities, a number of impacts/benefits to the region have been obtained, many of which have the potential to link with other ongoing activities to secure the long-term sustainability of these results, and promote the conservation of the coastal and marine ecosystems of the MAR.

- **Benefits to the region.** The close coordination of activities between WRI and UNEP-WCMC has yielded remarkable results in the region. Their activities have filled up a critical information niche by developing tools and producing data that no other initiatives had produced in the region. In addition, the wealth of expertise of the partners has been transmitted to other institutions and personnel in the region, thus providing significant transfer of information and capacity building.
- **Potential to link with other ongoing initiatives.** Analyses such as these can help to evaluate progress in reducing land-based sources of threat. A number of national initiatives, as well as donor-funded regional initiatives, seek to reduce or mitigate threats to the MAR. This analysis can help these initiatives to estimate their progress by giving them the information they need to ensure they are moving in the right direction.
- **Potential to target policies.** More detailed modeling is needed to create more accurate information at higher resolutions. Regional-scale analyses are useful for providing an overview and for prioritizing areas in which action is needed. However, *local analyses provide more detailed and accurate information that policymakers need in order to target their interventions.* The tools provided on the data CD, Watershed Analysis for the Mesoamerican Reef, allow users to perform more detailed analyses of sediment and nutrient delivery within smaller areas in the MAR region, such as at the watershed level. More specifically, the model can be applied to individual watersheds or groups of watersheds using data provided or with the user's own data. More detailed local modeling will improve the accuracy of the results, by using higher resolution data on slopes and land cover, and by calibrating the model to local soils and precipitation regimes.
- **Catalytic effects on other agencies.** Government agencies in each of the four countries are interested in applying the modeling tools at higher resolution for local areas to address specific policy questions such as: a) Targeting of implementation of better agricultural management practices; b) Integrated watershed management; c) Reforestation; d) Evaluation of progress against policy indicators / objectives. Land use scenario data outputs can assist in guiding land use planning both at the regional/eco-regional scale and at the national level. The project has catalyzed key stakeholders' thinking about land use planning by merely collating simple but relevant data on the changing physical landscape surrounding the Mesoamerican Reef. In presenting data and model outputs to these critical decision-makers, opportunities for collaboration not originally envisioned are created.
- **Beyond agricultural sector.** The land use scenarios outputs are also desired within the climate change sector for modeling of potential changes to carbon stocks over time. These models can provide an indication of economic benefits that might possibly be lost by unregulated expansion of agricultural frontiers. This is particularly relevant to nations involved in Clean Development Mechanism (CDM) projects through the Framework Convention on Climate Change (UNFCCC), and potentially in any future avoided deforestation mechanism (currently under discussion within this Convention).
- **Regional cooperation.** Transnational natural resource management can be strongly supported by analyses such as these. To mitigate and reduce the land-based threats to the MAR, constructive regional cooperation among a variety of stakeholders is necessary. Examples include the multilateral cooperation agreements among the four countries involved in this analysis, and agreements between the agriculture and tourism sectors and civil society groups. This tool works across borders and sectors, creating information that allows productive discussion on threat origins and potential mitigation measures

- **Beyond regional borders.** WRI partnered with TNC to bring the University of Miami onboard to implement a circulation model for the MAR region to examine the transport of sediment (buoyant matter) to the Mesoamerican Reef. Not only the region benefited from the knowledge gained, but the University also benefited from this research experience, and can incorporate the lessons learned in other studies.
- **Data flow.** Throughout the project, data has flowed not only from UNEP-WCMC and partners to the region, but also from the region to UNEP-WCMC and partners. As the biodiversity assessment arm of the United Nations Environmental Programme, UNEP-WCMC is more easily able to access data on the Mesoamerican region through its involvement in the project. Several improvements to the quality of the World Database of Protected Areas, which UNEP-WCMC manages, have been undertaken as a result.
- **Cross-fertilization.** While both the improved watershed management component and the project overall seek to provide decision-makers with results of analyses of impacts of current activities on the health of the Mesoamerican Reef, the project has had a welcome impact in the region with regard to the support of environmental information systems (particularly spatial analysis). This is accomplished both through the development of information products which enrich the overall regional and national spatial data infrastructures, but also through the enrichment and cross-fertilization with existing mechanisms for information sharing and data analysis. A prime case in point is the hosting of the project's spatial data products on SERVIR, the Mesoamerican System for Visualization & Environmental Monitoring. Both the ICRAN-MAR project and SERVIR are USAID-supported initiatives whose outputs are inter-related in terms of spatial data products. Not only does the data produced by the ICRAN-MAR project enrich SERVIR, but the wide dissemination of data through SERVIR has enhanced regional awareness of the project and its objectives.
- **Empowering local NGOs.** Local NGOs and organizations –particularly in Belize – had the opportunity to participate in capacity building efforts (trainings, meetings) and information sharing with WCMC and WRI (see Figure 4 in this report). Not only are these organizations now more aware of the relevance of their participation in this type of efforts, but also have the skills to continue training and collaborating with other conservation and management initiatives. By strengthening capacity through continuous transfer of analytical methods and data, the ICRAN-MAR supported regional efforts for empowering local NGOs.

Further needs and potential

- It would be valuable to extend the current analysis to include the effect of improved agricultural management practices on erosion and pollutant runoff. Such an extension would require detailed information on how each practice influences erosion rates and pollutant runoff. Once such information is available, it should be possible to use the model to evaluate reductions by treating each management intervention on each land cover type as a unique category with specific erosion and pollutant runoff characteristics. For example, citrus groves with cover crops planted to reduce erosion might be treated as a separate category. It is expected that WWF, as a result of their on-the-ground work with agribusiness and through their continuous Ecoregional work, can provide this type of information to feed the model.
- The scope of the current project did not include a module to calculate/consider the impacts of this sediment and nutrient delivery on the coral reef: how do different reef communities

and topographies respond? What are the drivers of vulnerability to sediment deposits? It would be valuable to collaborate with experts on this issue.

- The scenario modeling undertaken during this project stretches to 2025. Minimal attention is paid to climate change within the modeling, though increased vulnerability is described within the narrative scenarios. Any further development of this work could consider:
 - The future impacts of climate change on terrestrial issues such as agricultural suitability and fire frequency
 - The interaction between climate impacts on coral reefs (warming seas, coral bleaching, acidification) and sedimentation impacts
 - An obvious next step would be to look at marine reserve planning and vulnerability of existing marine reserves in the context of climate change and sediment threats. For example, network design could optimize larval dispersal opportunities and to include more resilient reef types (Schuttenberg 2001)¹⁴.
- There is scope for using this type of modeling approach in local to regional scale GEO exercises, and perhaps national scenario exercises, ideally with training sessions conducted in Spanish. Regional capacity building by involvement within the GEO process would be a useful way to go about this. At least in Latin America, GEO already has some direct access to a broad range of policy makers

5. Lessons Learned and Recommendations

Partnerships with agribusiness

- Original assumptions in implementation time and in seeking collaboration within the agroindustries were imprecise. Gaining trust from an agribusiness sector that was being attacked by environmentalists for contaminating the environment and depleting natural resources took longer than originally anticipated. It took time to make them understand the project's strategy of voluntary engagement and sustainable use of resources.
- When planning, consideration needs to be given to the agroindustries' willingness to participate and the different constraints and drawbacks they have in their agroindustries. Confidentiality and property rights have to be taken in consideration.
- Now that key agribusiness are on board and working voluntarily makes them feel as a part of the solution, project partners do not want to lose this momentum and are looking for further funding opportunities.
- Negotiation skills are necessary to build win-win relationships with the private sector. In the process of building private-public partnerships or when facilitating a process between communities and private entities, it is very important to refine the negotiation skills of the field team. This will provide better tools to reach out and better common understandings with this sector.
- The results from ongoing projects and the signature of MoUs by other key agroindustry players will play a positive role in convincing and softening new relations. Partners foresee that by the second semester of 2007 work will continue developing the toxicity units for bananas at Chiquita's farms; the recommendation is for other regional initiatives working with BMP's to follow this trend with agro-industry.

¹⁴ Schuttenberg, H.Z. ed. 2001. Coral Bleaching: Causes, Consequences and Response. Selected Papers presented at the 9th International Coral Reef Symposium on "Coral Bleaching: Assessing and Linking Ecological and Socioeconomic Impacts, Future Trends and Mitigation Planning". Coastal Resources Center, Univ. of Rhode Island.

- The removal or transfer of top managerial personnel in key agroindustry firms can delay activities. After one such change in staff it is necessary to gain the new manager's trust to continue with the activity.
- There is willingness from the private sector to communicate and share information on BMPs (e.g. biological control of insects in sugarcane fields. Growers from Mexico sharing this information with Belizean and Honduran sugarcane growers).
- Project's outcomes serve as the seminal knowledge-base for other related projects that can be developed and financed by the international donor community.
- Most agroindustry producers from the MAR area, Chetumal Bay, Mexico, Belize, Guatemala, and Honduras, now have a much better understanding about environmental protection, specifically in regards of pesticide use in their production enterprises and soil erosion. Their position on the approach taken by the ICRAN-MAR Project to gather their collaboration has been well taken by agroindustries. Now they believe that by participating voluntarily the project will achieve measurable results on the ground. Key producers from the different agroindustries are telling the story among themselves, which translates into good communication and outreach.
- The watershed management component of the ICRAN-MAR project has placed high expectations among international and local NGOs. The involvement of local partners has been crucial for success; however, to build trust and confidence has taken more time than we expected. The work done under this project will provide the basis for future agriculture work within the Mesoamerican Reef and can be replicated in any part of the world.
- UNEP's credibility and support was crucial to complete the activities committed under this component of the ICRAN-MAR project. A concrete example is the opportunity to get funding from CropLife Latin America to implement ICRAN-MAR activities in sugarcane fields in Chetumal Bay – Mexico, it would have been impossible without UNEP's participation.

Watershed Analysis and modeling

Technical – activities

- One of the major lessons to be drawn from the project is that of technology transfer. While institutions like the World Resources Institute and the World Conservation Monitoring Centre possess great analytical capacities, with proper engagement of local institutions and individuals, it is possible to build local capacity in meaningful ways. In the case of the work led by UNEP-WCMC, the decision was taken to hire both a skilled land use modeler as well as a spatial analyst from the project region, which served the dual purpose of getting activities done AND to simultaneously contribute to building capacity in the region.
- The watershed theme included analytical components implemented by WRI and UNEP-WCMC and on-the-ground activities lead by WWF. This combination of analytical and on-the-ground activities was very effective.
- Application of modeling tools that can be transferred to the region, such as the N-SPECT hydrological model, probably add more value than the very analytically-complex, computationally intensive models such as the circulation model run at the University of Miami, which requires a UNIX system and cannot be transferred
- Model validation is an important part of model application. The hydrologic and circulation models were validated, but rather late in the project. Emphasis on data collection for model validation and execution of validation earlier in the project would be useful.

- Validation of models is a vital component of a modeling effort. It can take considerable time to acquire appropriate data for validation. Collecting such data early in the project and doing preliminary validation as early as possible will help to identify potential errors in the model.
- A more conventional scenarios approach, with a narrative generation workshop prior to the modeling, would have helped maximize the relevance of the narratives to the region. This would have required a more substantial budget, to allow a scenario generation workshop as well as the evaluation and training workshop
- The only workshop featured in the project plan is a scenario communication and training workshop; a second modeling phase was not taken into account in the original design. Regional-scale scenarios produced from the GEO process had to be adapted for the MAR. While these do have broad legitimacy, the ideal situation is to develop the scenarios working together with the people who are interested in the results, and to be able to include their feedback after the first modeling round.

Coordination and Management

- During project design it should be necessary to make sure that all core partners have the staff and skills required for project execution. It took UNEP-WCMC approximately nine months to identify and hire consultants to begin their component of the project. This delayed the start of some key activities whose outputs were necessary for WRI and thus, compressed the time available for project execution.
- The ICRAN-MAR project strives to complement existing activities in the region. Significant effort was invested in trying to collaborate with the MBRS project, but unfortunately this was not possible to the extent originally envisioned.
- While it is important to share project plans and results, it is advisable not to make project activities dependent on groups or other activities that do not have the time/interest/resources to collaborate.
- Frequent reporting requirements have been found to be more time consuming than for most projects partners are involved in. It is consider that this has incurred costs in terms of staff and consultants' time that could perhaps have been better spent on the work itself.

B. SUSTAINABLE FISHERIES (IR2)

Local fishers' and cooperatives' capacity strengthened for sustainable fisheries management. (Through the development of industry partnerships, promotion of "best practices", training in financial management, resource management, and alternative income generation strategies.)

1. Threats – Rationale for Component Design

Fishing is probably the most socially and economically important activity for many coastal communities in the MAR region. In the last decade, however, catches have decreased as the key commercial species such as lobster, conch, snappers and groupers are over exploited. This trend represents a global crisis related to coral reefs, and unsustainable fishing practices are among the leading causes.

Along the MAR, the four governments have established a series of marine protected areas (MPA) to ensure the conservation of these ecosystems. Even though some MPAs have management plans, fisheries pressure disrupts ecological processes and alters food webs. There is a need of fisheries schemes in coral reefs systems for an integrated and effective

management –including fisheries– since many management plans were developed from a pure ecological point of view –ignoring the needs of fishermen–. Governments have not been able to fully attend this type of fisheries when the traditional approach for fisheries management has been applied –which has proved to be inadequate in multi-species / multiple gear fisheries–. In the MAR there are more than 60 fishermen villages with more than nine thousand fishermen that target from ten to 40 species. There is a need of a suitable approach to manage fisheries.

Adoption of better fishing practices (BFP) and monitoring of their potential effects contribute to localized management efforts. For the past three years, project partners World Wildlife Fund (WWF) and Reef Check engaged community stakeholders in education and awareness activities on the need to adopt better fishing practices, and trained them in ecological and socioeconomic monitoring of reef health using the Reef Check protocol.

The main objective of this component was to support the generation of tools and capacities for management to increase institutional capacity, dissemination of key information and creation of incentives for users and stakeholder groups that identify sustainable use patterns of the MAR's natural resources.

2. Description of Component Strategy – Dynamics

This component was designed around four original sub-results. Just like with the previous component, project partners engaged in extensive consultations with regional experts, local partners, and the private sector to identify opportunities for collaboration and potential common grounds where to develop more specific activities. Over the course of project implementation partners faced different obstacles that nonetheless did not prevent them from achieving significant results. Adjustments in project activities were necessary to adjust the original proposal to the realities of the region. These adjustments were reflected in each annual workplan seeking approval from the donors and the coordinating unit.

Sub-result 2.1 Community-based fishery management improved through development of appropriate partnerships with private and public sector and best practice guidelines for sustainable harvesting of principal MAR coral reef fisheries (led by WWF during the 3 years of project implementation)

Considering that unsustainable fishing, particularly overfishing, is pervasive throughout the MAR and remains one of the major impediments to a healthy reef system, the challenge at the beginning of the project was to develop a protocol for the community-based fishery management. This protocol should contain the guidelines to successfully promote the community-based fisheries management in the different types of organizations (associations, cooperatives, etc) of the four MAR countries. An important element under this management scheme was to develop partnerships with private and public sector, including the seafood buyers. Because of their economic value, seasonality, domestic importance, and gears used, the analysis of fisheries sectors in the four countries in the MAR, led to differentiate two types: 1) **Lobster Fisheries**, and 2) **Finfish Fisheries**. Therefore, the way to fulfill the first sub-result was to develop the guidelines for better management practices for lobster and for finfish fisheries.

Lobster Fisheries

Fisheries over-exploitation is a problem in the Mesoamerican Reef. The lack of appropriate fisheries policies or enforcement in each MAR country has enhanced the over-exploitation trends. However, this situation changes from country to country. Differences in economic development and institutional arrangements in the four countries made it necessary to

develop minimum standards and better fishing practices (BFP) to improve fisheries management. In order to face over-exploitation, implement BFP, and improve fisheries management, it was necessary to create partnerships between fishermen organizations and private and public sector, with different results in each country.

A diagnostic of the Lobster fisheries in the MAR concluded that the main problems are: 1) the illegal catch of under-sized lobster (baby-lobster); 2) capture of egg-laying females; 3) the use of unsustainable practices such as SCUBA diving, or diving with compressor; 4) fishing without proper permits, and minimal government resources for monitoring and enforcement; 5) Honduras fisheries are legally over-exploited; and 6) Mexico and Belize fisheries are exploited at their maximum levels.

All these elements were considered in the design of activities for lobster Better Fishing Practices (BFP) development, which were guided by the publication and promotion of the booklet: "How to profit by practicing sustainable fishing: Lobster Fishing Practices Guidelines for the Mesoamerican Reef" (See Annex 10).

Finfish Fisheries

Finfish Fishery in the MAR is more complicated to address. Fishing in the MAR is carried out by more than 9,000 fishermen from hundreds of poorly organized communities and cooperatives, and with little control over access to fishery resources. Governments for the most part, have been unable to adequately attend this type of fisheries; agencies in charge of fisheries apply the traditional approach for fisheries management, which has been proved to be inadequate in multi-species/multiple gear fisheries. Addressing this topic required a complex set of strategies, combining sub-results: 2.1. Community-based fishery management, and 2.2. Community-based ecological monitoring.

The ICRAN-MAR initiative developed a suitable ecosystem-based fisheries management (EBFM) methodology for the Mesoamerican Reef, which considers fishermen as main actors in site selection for ecological monitoring and data gathering accompanied by biologists and experts. The EBFM establishes a series of protocols for the use, monitoring and evaluation of the ecosystems where fishing takes place. This strategy aims to reverse environmental degradation, and to provide socioeconomic benefits associated with fishing, and to help project partners understand the effects of human activities on ecosystems. The protocols developed allowed partners to gather relevant scientific high quality information very useful in the designing of fisheries management.

The strategy to introduce the EBFM with fishermen participation was to identify marine protected areas (MPAs) with intense fishing activities; then organize workshops with fishermen and MPA authorities and design a monitoring program with fishermen participation.

Sub-result 2.2 Community-based ecological and socio-economic monitoring implemented where appropriate to support community assessment and monitoring of their progress in resource management. (led by Reef Check in collaboration with WWF during the 3 years of project implementation)

In addition to the monitoring efforts described above in the framework of the EBFM, Reef Check engaged community stakeholders providing training in the socio economical and ecological aspects of coral reef health, thus empowering them to be part of local solutions efforts to a global reef crisis.

Local communities and institutions were engaged since funding was provided for the implementation of the project. Local leaders and coral reef stakeholders in the four countries

were approached and later identified as potential implementers of RC-ICRAN-MAR activities. Engagement of Guatemalan stakeholders was lagged early in the project but came up to speed as more contacts were developed; communities in general responded very positively as they now have the much needed tools to provide local solutions to a global problem.

Training of fishermen and tour operators in monitoring techniques usually took place at park facilities allowing park staff and college students to attend the training sessions as well. Having a mixed and balanced group of novice and experience divers facilitated knowledge exchange and in turn increased the learning rate. Fishermen participants in the training activities were selected based on their level of involvement and use of park resources, as well as their interaction with park managers. By involving the fishermen there is a greater likelihood for their involvement in management efforts.

Through these activities local fishermen, in general, feel that as important stakeholders they are being taken into account for any management actions being designed for the region. They feel they have the capacity to assess the health of reef resources, enabling them in looking at ecological trends in their own terms. Project partners are strongly supportive of government-related strategies to conserve coral reefs, but also seek the empowerment of direct resource users that have a day-to-day impact on ecologically relevant species and critical habitats. By getting involved in local conservation efforts, trained fishermen can then be selected by managers for future work related to conservation in the area.

Sub-result 2.3 Key marine protected areas strengthened in collaboration with GEF/MBRS and PROARCA/APM (to demonstrate successful community-based fisheries to the wider community). (led by WWF during year one of project implementation)

Fishermen exchanges facilitate learning by sharing information to solve problems that fishermen face on a daily basis. At the same time, these activities increase fishermen trust in conservation initiatives, and raise the profile of their knowledge and perspectives to be taken into account for future conservation actions.

With the goal of strengthening fishermen organizations and capacity-building among fishermen groups, WWF sponsored fishermen participation at the “1st Workshop on Sustainable Fisheries in the Mesoamerican Reef” fostered by the MBRS in Chetumal, Mexico on November 2004. Fishermen from Quetzalito, Puerto Barrios, Punta de Manabique, and the Network of Caribbean Fishermen gathered to share technical information and financial knowledge, and ranged from well organized fishermen to those less organized from different countries and/or regions.

In addition to the above, during year one of implementation, WWF organized other fishermen exchanges, especially from Guatemala to Mexico (where fishermen associations are usually more organized and have more expertise in community management, and in particular fishermen from Punta Allen, Sian Ka'an). Fishermen from Punta Allen have overcome a history plagued with misfortunes, such as hurricanes, bankruptcy, and bad administration of their resources; currently they are among the most organized and successful fishermen communities in the region and they are willing to share their experiences and lessons learned. With these experiences Guatemalan fishermen learned about fisheries management, community based management, and resource and nature conservation.

Sub-result 2.4 Increased local community member's capacity to engage in alternative livelihoods such as community-based tourism. (led by WWF during the 3 years of project implementation)

To strengthen the capacity of local fishermen communities, project partners engaged in facilitating different training exercises in support of alternative livelihoods.

Considering the high dependence of fishermen on the fisheries resources in the MAR, and the over-exploitation trends that they show, fisheries have become activities of subsistence. A reduction on fish mortality and exploitation rates –to recover fish stock and make a sustainable use of the resources– requires a reduction on fishing effort, which means less days for fishing. Many coastal villages along the MAR lack basic services and schools, therefore formal education for most fishermen is less (and of lower quality) than national averages; for this reason, their opportunities to engage in activities other than fishing is not always easy.

Current trends in the economy of the region give signals that tourism will become the most important activity in the near future. Governments are investing on it, and fishermen may be an important component of this new activity. However, it is often difficult to provide attractive alternative livelihoods to fishermen that could substitute the income gained with subsistence fishing.

The revised strategy pertaining to sub-results 2.1, 2.3, and 2.4 contemplated completing most activities in Mexico¹⁵ by the second year of the project, where WWF’s fisheries staff is based and where there is a better understanding of the local circumstances. Field work in the other countries started analyzing particular situations and the general context to determine key stakeholders and the specific strategy per country. In Belize for example, much attention has been paid to the establishment of no-take zones, and the government has advanced greatly on that front. Therefore, the Fisheries Department from Belize expressed little interest in working with the EBFM methodology being developed under the auspices of the ICRAN-MAR project. During the third year of the project, work was carried out on a full time basis in Belize, Honduras and Guatemala, and the entire budget was invested in the activities for those countries.

Table 7: Fisheries Component – Percentage of efforts invested by country – as of July 2007

Strategy	Activities	México	Guatemala	Belize	Honduras
Lobster (BFP)	Workshops	100%	--	100%	100%
	Publication	100%	--	100% ⁽¹⁾	--
	Distr. Of Publications	100%	100%	10% ⁽¹⁾	100%
	Other meetings	100%	--	100%	--
Finfish (EBFM)	Workshops	100%	100%	--	100%
	Publications	100%	--	--	
	Distr. Of Publications	100%	100%	100%	100%
	Other meetings ⁽²⁾	100%	100%	100%	100%
	Monitorings	100%	100%	--	100%
	Studies	100%	10% ⁽²⁾	--	10% ⁽²⁾
	Other	100%	--	--	--
Alternative livelihoods	Fishermen Exchanges	100%	100%	--	100%
	Workshops	100%	100%	--	--
	Publications	100%	--	--	--
	Feasibility Studies	100%	--	100%	100%
Reef Check monitoring	Reef Check Centers	100%	100%	100%	100%
	Trainings	100%	100%	100%	100%

¹⁵ Fisheries sector has a higher level of organization (as compared to the other countries of the MAR) in Mexico, and it is where WWF’s Senior Fisheries Officer is based (reducing implementation costs)

Strategy	Activities	México	Guatemala	Belize	Honduras
	Surveys	100%	100%	100%	100%

(1)-English version of Lobster BFP is available in PDF format; it is being distributed only to fishermen leaders.

(2)-Due to weather extreme conditions, and internal re-organization of local partners, these activities will be finished by the third quarter 2008.

3. Major Outputs/Results – Impacts in the Region

The current section provides a narrative description of project results up to the end of the project and the impacts these have generated in the region. It also describes the potential opportunities for continuation beyond the life of the ICRAN-MAR project. For a summarizing table of project indicators and status, please refer to the indicators section of the executive summary in this report.

A) MAJOR OUTPUTS:

- A detailed study about all the lobster fishing techniques in the MAR. In cooperation with fishermen and local authorities identified the techniques that are more environmentally friendly, the ones that allow abiding to regulations, that reduce risks of illegal catching, and the ones that reduce the risk of health/security problems
- Development of lobster Manual “How to profit by practicing sustainable fishing: Lobster Fishing Practices Guidelines for the Mesoamerican Reef” (see Annex 10). The content of this book was discussed with fishermen before it was printed (Spanish and English versions), and in spite of its technical and scientific contents, the language it uses is rather simple, making it an easy reading for fishermen. This booklet became the core of the project, guiding fishermen to adopt better fishing techniques. It gives relevance to organization agreements, emphasizes the importance of abiding regulations, and educates fishermen in the knowledge of the resource.
- More than 1,200 copies were distributed among fishermen in workshops, fishermen exchanges, training sessions, meetings, etc. Through these activities project partners identified fishermen cooperatives and groups that are performing better management practices and some fishermen are working to obtain the Marine Stewardship Council (MSC) certification, which will be an important consequence of the ICRAN-MAR project.
- Production of other educational materials (see Annex 11 for plasticized cards)
- Two MoUs signed with organized fishermen and private sector from Mexico and Honduras (including the Regional Federation of Cooperatives from Quintana Roo, Mexico – over 1,000 fishermen members). The purpose of these MOUs was to collaborate to perform joint and individual activities to achieve sustainable use of fisheries resources in the region. These MOUs established the basis for cooperation between WWF and fishermen organizations to continue lobster BFP, and to support the MSC certification process
- An informal agreement between a local restaurant based in Cancun and the fishermen from Cooperative Cozumel (Sian Ka’an, Maria Elena), who are implementing ICRAN-MAR lobster BFP. The 90 fishermen from that cooperative agreed to use BFP and sell their product directly to the restaurant. MSC is promoting their eco-certification to ensure that fishermen are catching lobster under BFP. Changes recorded in Cooperative Cozumel are rewarding, and demonstrate that ICRAN-MAR initiative was positive.

- The ICRAN-MAR project contributed significantly to create and consolidate the first partnership between the private company Darden¹⁶ and the industrial fishermen from Honduras (APESCA) to initiate pilots to introduce environmentally-friendly traps –developed by PROARCA– in artisanal and industrial fisheries¹⁷. During the process of partnership consolidation, the Directorate of Fisheries and Aquaculture (DIGEPESCA) from the Honduras government was a special guest. The aim of this alliance is to stop the deterioration and over-exploitation of the lobster stock in the country. As an ICRAN-MAR partner, WWF provided technical assistance to the fishery industry to implement a pilot project with better fishing practices; results will be measured by February 2008, when the lobster season concludes.
- Development of an EBFM methodology for the region and production of the book¹⁸ “Best Fishing Practices in Coral Reefs; Methods for collecting ecological data that support the Ecosystem-Based Fisheries Management” (See Annex 12). This methodology was successfully tested in Yum Balam, Mexico, after Hurricane Wilma hit Holbox fishermen village. The book was produced with direct contribution from local fishermen through their participation at various workshops, field monitoring exercises, and incorporating their inputs. The protocol for this methodology was published by ICRAN-MAR alliance and distributed among fishermen, MPAs staff, government and academia. This protocol was developed considering the opinion of main stakeholders, including scientists, MPA managers, fisheries authorities, agencies in charge of environment, etc. The protocol is being used in six protected areas to design, re-design and make adjustments to their management plans. Fishermen are taking an active role in this initiative.
- Reef Check centers were set up in the four ICRAN-MAR countries, providing trained staff and educational materials in Spanish and English (See Annex 13a and 13b)
- Production of updated Reef Check educational materials and data collecting and analysis tools in English and Spanish usable by non-scientist immediately after field surveys are completed
- At least 314 community members trained in Reef Check’s socioeconomic and ecological monitoring of coral reef health. Trainees include local trainers, fishermen, Diving staff, students, park staff, and general public (See Annex 1 for more information). The protocol allows monitoring of ecological and socio-economic parameters to assess the progress of local management efforts and contribute data to produce the annual global reports on reef health.
- Design and set up of a coral reef monitoring program inside and outside MPAs. Training, data collection and analysis are conducted locally by community stakeholders, making them part of the solution of the global coral reef crisis.
- At least 145 Reef Check monitoring surveys conducted over the duration of the project in all ICRAN-MAR countries. Surveyed sites consisted of reefs located inside and outside existing MPAs and data collected by community members (fishermen, dive industry staff, NGOs staff, academia) is currently used locally and globally for MPA management efforts.

¹⁶ Largest seafood buyer from the US; it manages the restaurants “Red Lobster

¹⁷ Darden has given a grant to APESCA to produce the traps and will pay on-board observers who will certify that fishermen are no longer taking undersize and pregnant female lobsters

¹⁸ The book has three sections of specialized content in statistical and ecological analysis, as well as electronic spreadsheets programmed to perform ecological calculus after capturing data on fish assemblages and coral video recording. With these tools, MPA staff can update the information that is useful in developing fisheries management plans.

- During the first two years of the project, more than 60 fishermen from Guatemala, Belize, Honduras and Mexico were trained in different skills such as ecotourism and mariculture. Ecotourism training included topics such as guiding, business management, bird-watching, kayaking, and SCUBA diving. As a result of these trainings some fishermen expressed interest in performing business enterprises, mostly in mariculture, and less in ecotourism. However, during the last year of the project, a study was performed to determine the feasibility of the whale-shark swimming and watching as an alternative livelihood for fishermen from Yum Balam (Mexico). (See Annex 14)

Intermediate steps for achieving these outputs also included:

- For the development and promotion of lobster BFP: 10 workshops organized, two studies carried out, three different publications released (English and Spanish), one fishermen exchange organized, over 3,000 printed materials distributed among fishermen and stakeholders, and two MOUs signed.
- For the development and promotion of EBFM: 10 workshops¹⁹ organized, five studies carried out, five monitoring exercises undertaken, two publications released (English and Spanish), three fishermen exchanges organized, and over 1,000 printed materials distributed among fishermen and stakeholders. Equipped with these skills, fishermen were able to participate in the data collection and monitoring²⁰ of fish populations and gained the knowledge needed to play a strong role in designing future management options that meet their needs and protect fish populations for the future.
- In Banco Chinchorro (Mexico), more than 50 fishermen participated in three workshops to select sites where to apply the EBFM monitoring protocol. 15 fishermen from the three cooperatives that catch in this MPA were trained and they participated in the more exhaustive monitoring effort ever performed in Banco Chinchorro. The result was an extraordinary Data-base that currently is being analyzed –data should be analyzed by early 2008– to determine the best options to perform fishing reducing the impacts on key ecosystems.
- ICRAN-MAR project concluded a public consult to develop better fishing practices for lobster in Belize; however, there was not enough time to disseminate them through the fishermen villages. Fishermen from the four cooperatives participated in a series of workshops to develop the BFP for Belizean fishermen.
- The first meeting with the certifier recognized by the MSC took place in Chetumal, Mexico in May 2007. Positive results included stated support from Mexican authorities, academia, and local NGOs to fishermen who voluntary asked for this eco-certification. In this regard, ICRAN-MAR better fishing practices were the first step to foster a potential eco-certification.
- Several fishermen exchanges were carried out training fishermen in different aspects, such as better fishing practices, ecosystem based fisheries management, organization, and development of a plan to reduce the illegal fishing and poaching. The last of such exchanges took place in Banco Chinchorro, in April 2007; 40 fishermen and eight MPAs staff from the four MAR countries participated in the workshop.

¹⁹ Covering pertinent information such as sampling techniques and information analysis, critical habitats and monitoring sites selection, open water SCUBA diving and certification, species identification and monitoring techniques, and ecological data collection

²⁰ Once completed, fishermen learned how to: (a) take a census of adult fish along a 50 meter transect, (b) measure topographic complexity along the transect, (c) use video to record the bottom along the transect, (d) count the number of coral colonies along the transect, (e) sample benthic groups using the intercept point technique, (f) record key invertebrates along a band transect.

B) SCOPE OF RESULTS/IMPACTS – RELEVANCE OF OUTPUTS TO THE REGION

Results achieved to date provide evidence of the relevance of conducting this work for the benefit of the MAR.

Over the course of these years, the project concept allowed developing a systematic organization of relevant activities leading efforts towards the sustainable use of fisheries resources including building alliances with the private sector, community-based management, ecological monitoring, and to a less degree alternative livelihoods.

1) Best Fishing Practices – Community management and local participation

For many years, conservation efforts in the MAR have not been easy to address within the fisheries sector because of the lack of solutions that satisfy fishermen needs. Different projects have not been able to satisfactorily reach out to the thousands of users spread throughout the 1,000 km of coast, who are catching over 100 species using 50 different gears. The ICRAN-MAR project has been able to propose a potential way to successfully approach the sector: BMP for lobster coupled with community-based management using EBFM, and fishermen participation in ecological monitoring. Still, due to the nature and complexity of the problem, it will take some time before these avenues can demonstrate greater impacts. Results under the ICRAN-MAR project nonetheless have paved the way for long-term conservation and community management efforts in support of healthy reefs and healthy communities.

The community participatory strategy followed by the project was vital to gain fishermen trust and collaboration to achieve project results. Fishermen welcomed the educational project materials on better practices that were produced especially for them²¹. Their active participation through discussions, workshops, studies, and drafts revisions for the elaboration of these materials, gave them a sense of ownership, a feeling that they are some of the main “actors” in those books and therefore, they are more willing to practice some of those recommendations. They enjoy discussing fish species names, abundances, sharing empirical ecological and biological information, and learning from scientists and from other fishermen. The English version of the book was not released before the project concluded; therefore the impact on the Belizean fishermen (English spoken) was not the same as in the Spanish-speaking MAR countries.

Workshops organized in different villages to discuss BFP allowed fishermen to express their points of view regarding the possibility to shift their current techniques to BFP. While some fishermen²² understand and recognize the usefulness or practicability of the BFP techniques, others express doubts about the efficiency of BFPs as compared to their traditional techniques. Fishermen exchanges served to change this perception and slowly more fishermen are considering adopting BFP. A significant achievement is the commitment from the Regional Federation of Cooperatives from Quintana Roo, Mexico, to adopt and promote the use of BFP.

²¹ Such as the booklet “How to profit by practicing sustainable fishing”, plasticized cards, posters, or “Best Fishing Practices in Coral Reefs”. The simplicity of the text, and the illustrations on it made it a very attractive instrument for fishermen to use it as a guide for their activity.

²² In Punta Herrero, Mexico, fishermen have stopped using the hook, and they are using shades and “hammo”. In different villages from Belize, fishermen are trying using shades and traps instead of hooks.

All these activities set the basis to achieve more ambitious goals, such as lobster fishery certification, or the establishment of a monitoring system of BFP that allows fishermen to guarantee that their lobsters have been caught using BFP (some seafood buyers have expressed their interest in buying this lobster at a preferential price). In fact, in October 2006, WWF and the Fishermen Federation from Quintana Roo requested a two-year grant from the Sustainable Fisheries Fund to conduct a pre-assessment of six lobster fishing cooperatives²³ along the Caribbean coast of Mexico. ICRAN-MAR Best Fishing Practices resulted in a great interest from fishermen to pursue the Marine Stewardship Council certification. This MSC certification for lobster activity is ongoing and will have results at the end of 2007.

From the 19 fishermen cooperatives that hold permits to exploit lobster in Mexico, five adopted the better fishing practices, and are in the process of achieving eco-certification. After participating in different training workshops and events organized by the ICRAN-MAR project, the Cozumel Cooperative –which catches lobster in Sian Ka'an Biosphere Reserve (Maria Elena) – made significant changes in self organization. ICRAN-MAR training in finance, organization, and fishing techniques, helped this cooperative to get financial support from governmental institutions to create facilities to store, and distribute live lobster caught with BFP. During lobster season 2006-2007, Cooperative Cozumel sold lobster directly to restaurants and hotels in Cancun. All these changes are helping to make a sustainable use of the resource, allowing the undersized lobster and pregnant females to escape fishing, and at the same time fishermen are increasing their profit by selling directly to consumers.

Darden's grant to start the use of BFP among Honduras fleet to catch lobster demonstrates a great commitment with the ICRAN-MAR initiative to introduce BFP in Honduras. This has resulted in a strong partnership and commitment between vessels owners who participate in the project and Darden. This partnership required a great effort from WWF staff in order to match agendas of vessel owners, Darden's managers and high level governmental officers. Convincing the vessel owners about the convenience of improving the wooden traps took several meetings, and workshops, as well as making contacts with Darden's manager, including WWF staff based in Washington. The results are highly positive, and now the ICRAN-MAR project has provided the basis to keep a strong relationship with fishery industry from Honduras and other regional entities.

The ecosystem-based management (EBFM) approach introduced under the ICRAN-MAR project was a novelty in the region. It responded to the need of bridging the gap between fishermen and MPA managers and promotes the sustainable use of the resources. The project elaborated one of the first cases in the world where EBFM is applied to elaborate management plans involving fishermen in scientific data gathering. This initiative had a positive impact in Marine Protected Areas where fishing is an important activity. MPA's authorities welcomed the methodology to work with fishermen to produce the basic information that can lead to the establishment of a management plan. Originally, five MPAs requested to participate in this program: Yum Balam, Banco Chinchorro Biosphere Reserve, Cayos Cochinos National Park, Cuero y Salado Wildlife Refuge, and Punta de Manabique Wildlife Refuge. These sites are conducting ecological monitoring using the EBFM protocol with participation of MPAs staff and fishermen.

An important number of communities requested to participate in the initiative supporting the adoption of BFP and expressing their interest in engaging in sustainable and profitable

²³ Six cooperatives with 255 fishermen who have concessions to catch lobster in the Biosphere Reserves Banco Chinchorro and Sian Ka'an

alternative economic livelihoods. As the project was implemented more and more communities became aware of the significance and potential of their contribution to maintaining healthy reef ecosystems.

MOUs and other agreements signed between WWF, fishermen organizations, and private and public sector were used to increase awareness between main institutions representing national fisheries organizations in each MAR country. Through these agreements, ICRAN-MAR initiatives have increased their impact, involving a higher number of stakeholders.

2) Ecological and socio-economic monitoring

The Reef Check protocol came to the MAR region to fill the gap between the global coral reef community and local community members (fishermen, dive industry staff, etc) by providing a monitoring protocol that can be used frequently and very inexpensive by locals to monitor the effectiveness of management actions and the potential effects of the fast-growing coastal tourism industry, also being able to compare data to thousands of other reef sites around the planet and apply lessons learned in those sites.

Monitoring results using the Reef Check Protocol reflect the reality and current status of fisheries resources in the MAR region, documenting coral bleaching, and the scarcity of economically important species and reduced population levels of second-order reef fish species like parrot fish and snappers. Besides creating a scientific baseline on the current trends of reef health on the region, this data collection process not only serves to document the status of reefs, but also empowers the communities in the MAR region and raises local awareness and supports localized management efforts.

Implementation of RC activities under the ICRAN-MAR project served to produce continuous presence on the ground (and in the water) of RC trainers and trained divers in the monitoring of ecological and socio economical aspects of coral reef health. Allowing non-scientist to collect valuable data and educational support in areas where highly expensive and isolated scientific expeditions were lacking or had limited capacity. This can be easily measured in the vast amount of data collected over the life of the project, which has contributed valuable information for local managers, general public and to the Global Coral Reef Monitoring Network and that is available online free of charge. In addition, local dive centers started to get the necessary tools to get involved in local reef conservation efforts while they receive financial incentives to offer an added value service to their clients.

Training workshops were not only used to training local stakeholders in coral reef monitoring but also to raise awareness of the coral reef crisis at a local level, making emphasis that these crisis occurs also at the global level. Data collected by local coordinators and participating community members can be viewed, analyzed and compared globally free of charge online at <http://datamanagement.reefcheck.org/>. Users can view and download or print individual data sets from surveys, as well as comparisons between all Reef Check sites (+6,000) and conduct basic statistical analysis with the data. A full report containing results from Reef Check surveys conducted for this ICRAN-MAR project (Mexico, Belize, Guatemala, and Honduras - 2004 to 2007) can be found as Annex 15

In Honduras and Belize, existing NGOs (Cayos Cochinos Foundation, and Green Reef, respectively) were selected due to their long history and experience with the communities, but in Guatemala and Mexico, ICRAN-MAR promoted the creation of two new NGOs (Reef Check

Guatemala, and Oceanus, respectively). Existing and newly formed NGOs now continue to serve as Reef Check centers for training and monitoring in their communities.

Collaboration with National Parks ensured that trainees were active users of coral reef resources in the MAR area. That is the case with “*Parque Nacional Arrecifes de Cozumel*”, which has been partnering with Reef Check to conduct training workshops and facilitate surveys in Mexico.

The involvement of the private sector was also fundamental for the implementation of these activities; there is great interest from local tourism operators to get the necessary tools and develop the skills to participate in conservation and offer this added value to their costumers. Fishermen cooperatives have also being engaged, Punta Allen fishermen have strongly indicated their efforts in coral reef conservation as a mean to make fishing sustainable in the long term.

Monitoring campaigns reports, and publications on Ecosystem-based Fisheries Management, as well as meetings minutes with MPAs managers are being used to develop Fisheries Management Plans in each of the MPAs participating. At the same time, all these outputs are very helpful in disseminating the experience to provide support to other MPAs in the region that can start similar activities to improve their coral reef conservation strategies.

3) Increased capacities for local community members to engage in alternative livelihoods

Alternative livelihoods require high investments in training, finance, risks related to new ventures, etc. In addition, alternative livelihoods are highly constrained by local and regional markets. Training in specific alternative livelihoods is not a good strategy without a previous financial analysis, business plan, and market study.

Early training activities included tour guide training courses for fishermen in Sarteneja (Belize), Sian Ka’an, and Xcalak (Mexico); as well as two workshops on the mariculture of seaweed for regional fishers in collaboration with Alan Smith, a leading regional expert and trainer from CANARI in St. Lucia. However, alternative livelihoods seem to depend more on the market forces than on the capacity to provide good or services from the fishermen communities; therefore, activities developed in the first year of the ICRAN-MAR project in training fishermen in ecotourism and seaweed culture did not produce significant changes in their activities. Experts on mariculture suggested that international markets demand exotic species that could become invasive in the MAR. For that reason, seaweed culture may not be a competitive activity as alternative livelihood in the MAR.

Few trained fishermen were expecting more technical guidance and financial support like grants to invest, and engage in alternative livelihoods with a minimum risk. For that reason, the strategy changed and specific financial studies in selected sites (i.e. Hol Box, Mexico) were performed. The sites chosen were those that previously demonstrated to be successful case-studies, which guaranteed that the financial analysis would provide additional knowledge and guidance to keep developing the alternative livelihood.

A more recent effort under the ICRAN-MAR project (See Annex 14) reports that whale-shark swimming service provided by fishermen from Holbox has become an important alternative livelihood for fishermen, and they have stopped fishing 50% of their time, since high aggregations of whale-shark occur every year from May to September. Hundreds of visitors from U.S. and Europe demand the service paying a high price to experience this activity.

4. Impacts and the Larger Scale – Leveraged Support – The Way Ahead

Fisheries activities undertaken with the auspices of the ICRAN-MAR project have been innovative and have created great expectation among fishermen and other stakeholders.

- **Leveraged support**²⁴. Financial support from other institutions was leveraged to consolidate project results and to expand and continue some activities beyond the life of the ICRAN-MAR project. The ICRAN-MAR Project was very successful in building capacities and experience, and generating important results that demonstrated to be of interest for new financial sources. Sustainable Fisheries Fund provided a grant to support artisanal fishermen from Banco Chinchorro and Sian Ka'an Biosphere Reserve in pursuing MSC certification for lobster. Munson Foundation, Summit Foundation, Kukulcan Plaza, and FFEM have provided support for EFBM activities and to complete management plans in five Marine Protected Areas.
- **International forum.** FAO (Food and Agriculture Organization) and GCFI (Gulf of Mexico and Caribbean Fisheries Institute) have a great interest in addressing the challenges for sustainable fisheries in the Caribbean. There has been close communication with these organizations for the production and application of the lobster manual. They have been helpful venues to approach private sector on environmental and marine resource problems. ICRAN-MAR had a constant representation in international fora, such as FAO and NAFE (North American Fisheries Economist Association). All these examples show the impact of the project, which is being enhanced through new alliances and collaborative efforts to revert the over-exploitation trends of fisheries in the region.
- **Filling gaps.** WWF is developing an alliance with OSPESCA, the regional organization in charge of fisheries, to make recommendations to the Honduras government on its institutional arrangement for fisheries management (and overcome the hurdle of changes in fishery policies with every change in governmental period of 4 years in Honduras).
- **Developing marketing linkages.** Major seafood buyers like Darden are interested in supporting these BFPs by partnering with fishermen organizations to introduce environmental-friendly traps, support lobster certification processes and promote markets for lobster obtained with BFPs. In time, it is expected that this first step will be followed by other companies.
- **Coordinating with other initiatives in the region.** Communication and coordination with other partners is very important to avoid duplication of efforts and facilitate information sharing. Over the last three years partners have been successful in bringing leaders from different key organizations to meetings where projects were discussed and information was gathered. Feedback provided at these meetings allowed some organizations to delineate future actions and projects, improved cooperation, and duplication is decreasing with the time.
- **Reducing open access.** An important avenue to explore in the future is that of responsible fisheries: It is fundamental to reduce open access in MAR fisheries, which can be done by strengthening current fishermen, providing them legal tools to avoid poaching (such as concessions, community surveillance and enforcement programs, or management plans),

²⁴ See Table 1 in the executive summary for more information

providing them scientific support for fisheries and ecological monitoring, and training in organization or helping them to have their own financial support to keep those programs.

- **Capacity building.** The creation of RC centers at the four ICRAN-MAR countries enables local stakeholders to continue RC activities (surveys and trainings) on the long term, beyond the life of the ICRAN-MAR. At the same time, they now have the tools needed to support other project initiatives and leverage funds on their own with or without RC supervision.
- **Communities and local NGOs empowered.** This project served to strengthen and empower local stakeholders in current coral reef conservation educational and monitoring tools. Local NGOs and fishermen communities and cooperatives were actively engaged in capacity building efforts (trainings, educational meetings, fishermen exchanges, etc.) providing the basis for the successful implementation of this component (See Figure 4 in this report). Not only are these communities now more aware of the relevance of their participation in conservation efforts, but also have skills to complement their fishing income sources and to collaborate with other conservation and management initiatives and. It is important to note also that one of the most important aspects of the Reef Check protocol is that it can be learned by the majority of community members in developing countries, where local capacity in using highly scientific monitoring protocols difficult if not impractical to achieve.
- **Practical methodology.** Reef Check Foundation and local partners are collecting baseline information on the status of coral reefs inside and outside of protected areas with unprecedented frequency. The monitoring protocol that was designed by Reef Check has proven to be simple and yet scientific enough to be able to be used by anybody interested in coral reef conservation and basic snorkeling skills and no scientific background.
- **Contribution to global efforts.** An important aspect of the implementation of the Reef Check surveys has been the documentation of the bleaching events that have been affecting coral reefs globally. During 2005 Caribbean reefs suffered one of the strongest bleaching events ever recorded, and devastating effects are evident. Local volunteers are expecting to continue monitoring Caribbean reefs on a continued basis and they are prepared to document any other bleaching events. This documentation will support conservation efforts to address problems related to global warming. Project partners have already provided data to NOAA Coral Reef Watch for the compilation of information on the main 2005 Caribbean bleaching event.
- **Sharing lessons.** During the International Tropical Marine Ecosystems Management Symposium in Cozumel (October 2006), Reef Check brought together coordinators from all over the world for an update in the development of Reef Check Eco Action Program. MAR country coordinators participated actively for the first time in such an event and contributed lessons learned during ICRAN-MAR to other RC coordinators from other regions.
- **Continuous need.** A lot more monitoring and training is needed to address the scale of the coral reef crisis, and this will take the efforts of many organizations in the MAR region and elsewhere. The ICRAN-MAR project has showed that it is possible to contribute implementing a volunteer-based program to monitor coral reef health in a frequency that would be significant to detect changes in case of natural disasters (i.e. Hurricanes) or human interventions in the long term.

5. Lessons Learned and Recommendations

- Given that fishermen ply their trade in areas they know well, their participation is fundamental to the process of identifying fishing sites to be monitored. Experienced fishermen have substantial empirical knowledge based on observations over many generations. Incorporating fishermen inputs is very important during all the process of field monitoring. It also helps build trust with the fishermen with respect to EBFM, and provides legitimacy with the fishing communities as their knowledge is taken into account when building databases.
- Challenges may surface when adapting globally used educational materials to local names and concepts to a non-scientific community. It is important to get timely contributions from local stakeholders to accurately overcome these challenges.
- More monitoring and training is needed to address the scale of the coral reef crisis. But it is possible to use a volunteer based program to contribute
- To pursue long-term sustainability of conservation efforts in the MAR region it is important to support the creation of solid local foundations providing tools and capacity building.
- Tuning private sector and fishermen to work together in a win-win relationship takes a significant amount of time. It requires raising fishermen standards to speak in the appropriate language, and convincing private sector on the importance of marine resources conservation.
- The human dimension in the protection of the MAR ecosystems is very important to achieve successful results. Fishermen want to be part of the new processes that are emerging in the region (domestic policy is promoting the development of other more profitable activities such as tourism).
- It is necessary to develop more regulatory management schemes, but at the same time develop processes by which fishermen are aware of the importance of voluntarily protecting the ecosystems. Future projects in the region must keep in mind the importance of providing fishermen with skills that help them perform economically feasible activities.
- In the future, in some countries fisheries management plans will be a significant part of MPA management plans. It will be a difficult but necessary step to determine the maximum number of fishermen that an MPA is capable to sustain with a minimum quality of life, without putting in risk the ecosystems and the biomass. If open access is not avoided, the current trends of degradations produced by fisheries will continue until reaching dramatic condition of coral reefs in the MAR.
- Fishermen exchanges are a very effective tool for training fishermen in all the topics related with the ICRAN-MAR initiatives (e.g. lobster BFPs, EBFM, alternative livelihoods). When fishermen from one village share their experience about changes made, with other village or country fishermen, it is easier for non-trained fishermen to accept the possibility or the desire to experience similar changes. When fishermen talk about their daily problems and how ICRAN-MAR or other initiatives help them to solve their problems, participants are willing to disseminate positive experiences and share them with fishermen from their home villages. These fishermen exchanges opened the possibilities to successfully implement ICRAN-MAR project with a higher number of stakeholders.
- Once the pilot project between ASPESCA and DARDEN is completed, it will be necessary to develop a larger plan in partnership with the government of Honduras to implement better fishing practices in the entire fisheries fleet that uses wooden traps.
- A technical need related to lobster over-exploitation is to provide guidance to the fleet that exploits lobster using divers. As ICRAN-MAR partner, WWF is developing the first lobster

stock assessment in Honduras and measuring the potential impact of both fleets. This will help to design a strategy with quotas per fleet, to reduce the participation of the fleet with divers, whose impact is larger than the vessels using wooden traps.

- Producing significant changes in fishermen cooperatives can take time, thus, it is necessary to provide enough training. It is easier for those Cooperatives that have concessions to exploit lobster in a specific area where enforcement restricts the access to other fishermen, to adopt BFP. In this regard, it is necessary to identify the cooperatives that fulfill these characteristics, and train them to implement BFP.
- Even when government has participated in the initiatives organized by ICRAN-MAR alliance, it is still necessary to formalize partnerships with governmental agencies in charge of fisheries. Recognition of the ICRAN-MAR initiatives by governmental fisheries institutions will contribute to disseminate easily the fisheries management improvements produced by ICRAN-MAR project
- It is necessary to increase the knowledge about the cooperative system and fishermen organization in Belize to promote better practices and enhance the relationships between fishermen and their cooperatives. Changes in fishing practices will require more training to fishermen from different villages, and people with higher standards will be able to achieve eco-certification for good practices (e.g. fishermen from Northern Fishermen Cooperative Society Ltd.)
- Once the EBFM protocol has demonstrated to successfully contribute to fisheries management; it will be necessary to call fisheries and environmental agencies from the four countries to participate, coordinate, and invest more efforts and resources in fisheries management plans using the ecosystem approach produced by ICRAN-MAR alliance. It will be necessary to include the EBFM protocol in the MPA's management plans.
- It is necessary to develop financial analysis, business plans, and feasibility and market studies to promote engagement in alternatively livelihoods in fishermen villages. Although WWF has the expertise to perform such studies, it is recommended to develop a suitable methodology (step-wise approach) to promote changes in sustainable alternatives livelihoods. The methodology must include minimum accountant skills and financial indicators that fishermen can calculate and use, in order to avoid bankruptcy after a period of time.
- There must be a higher commitment from governmental agencies to invest in alternative livelihoods, once they have demonstrated to be feasible.
- It is necessary to dedicate more time to other fishermen cooperatives to magnify the results of this project.
- Experience dictates that when fishermen actively participate in the field work and provide basic data for scientific analysis, they are more receptive to the recommendations that can emerge from the scientific studies. The next step after creating the baseline analysis of fish populations and status is to begin to formulate management recommendations like no-take zones and other designations. As this research progressed, WWF presented the findings of the research to the fishermen to get their input and reactions. As stated above, WWF has already created the baseline study in Yum Balam, now WWF is using maps to visually present these studies to the fishermen, as well as a diverse group of other stakeholders like MPA authorities, rangers, and fisheries managers.
- Some educational products must be improved taking in consideration the characteristics of the targeted audience and the experience obtained during the project. The size of the lobster BFP plastic cards needs to be reduced so that fishermen can carry them in their

boats for constant use and consultation. The amount of text needs to be reduced and the illustrations increased to make them more attractive to fishermen.

- The identification and empowerment of local Reef Check coordinators was essential for day-to-day follow up of project activities. Enabling local capacity during the implementation of the project now ensures a greatest potential for continuation of project activities beyond life of the project given funding availability.

C. SUSTAINABLE TOURISM (IR3)

Through partnerships established with the marine tourism sector, business guidelines and better practices are refined and implemented, thus creating a sustainable industry minimizing threats to the MAR

1. Threats – Rationale for Component Design

Tourism is the fastest growing industry in the MAR, with diving and coastal tourism as the principal socio-economic drivers in the majority of sites in the region. In response to the demands of increasing numbers of tourists in the region, many destinations experienced rapid growth and development of coastal infrastructure and marine recreation activities. Additionally, the region has seen exponential growth of cruise ship tourism in recent years, bringing an estimated 6 million tourists to Mesoamerica in 2004 alone.

While this growth in tourism development and associated activities has brought economic benefits to communities throughout the MAR, the area has simultaneously seen an increase in negative impacts to reef resources, including pollution, over-fishing, improper sewage disposal, and irresponsible marine recreation activities. Stakeholders in the tourism industry have the potential to identify and implement best practices and models of sustainability that channel the resources of this sector in support of coral reef conservation and protection.

Over the last three years, partners CORAL, UNEP-DTIE, and WWF facilitated a stakeholder-led process in the marine tourism industry, resulting in the development of comprehensive conservation and safety standards for marine recreation activities such as scuba diving, snorkeling and boating operations.

2. Description of Component Strategy – Dynamics

This component was designed to promote sustainable tourism in the region by:

- Fostering regional dialogues across a broad sector of industry stakeholders leading to collaborative action on embracing sustainable tourism
- Facilitating the development of standards and a voluntary code of conduct that can be applied throughout the Mesoamerica region and potentially elsewhere in the Caribbean
- Providing training and support for adoption of the code of conduct complete, leading to the private sector in the MAR being fully engaged in the practice and promotion of sustainable marine tourism

Initially, project partners focused efforts heavily on outreach to both introduce the project to multiple communities throughout the region, and recruit participants to develop the marine recreation standards. This early outreach culminated in three national learning workshops which realized excellent attendance and participation by a broad set of interest groups in the region, including tourism industry associations, marine recreation providers, boat captains and

tour guides, the cruiseline industry, non-governmental organizations and academics, bulk purchasers of tourism activities, local community groups, and many others (See Annex 1). The national workshops helped project partners realize the broad level of interest in the initiative from across the region. Yet they also helped project partners realize the limited nature of funding for this first phase of the project. It became clear early that a concerted effort would need to be made, even with budget limitations, to engage the marine tourism sector beyond the three pilot sites that were eventually selected for the project.

Due to limited resources for execution of this first phase of the project, partners focused their efforts in three pilot sites: Playa del Carmen, Mexico, Placencia, Belize, and Roatan, Honduras. While considerable effort has been expended to maintain a regional presence in the region, 80% or more of our resources have been utilized on work in these select pilot sites. While direct work is carried out mostly in the pilot sites, partners maintain a regional approach to certain key programmatic elements, such as stakeholder involvement in the standards development process, broad measurement of current industry practices, and testing and implementation of the standards and code of conduct.

Project partners capitalized on interest and momentum generated at the national workshops to maximize recruitment for the standards development process, survey current industry practices throughout the region, and engage the taskforce steering committee (STC) to identify topics for standards development, set operating procedures in place, and launch the standards development process with the whole committee. Simultaneously, under CORAL's leadership and with collaboration from WWF, the first training workshops in the pilot sites were conducted, raising awareness on issues ranging from coral reef ecology, identification of local threats, establishment of locally driven solutions, and marketing conservation and sustainability.

As partners moved into year two of the project, momentum was gained and widespread participation was realized in the development of three marine recreation standards, including scuba diving, snorkeling and boat operations. Surprisingly, when balloting was conducted, unanimous approval of the three standards was achieved by members of the taskforce committee, which is rare in standards development. This unanimity gives the project strong leverage as it moves into the testing phase for standards implementation (ongoing in early 2007).

The second workshop series, 'Conservation in Action', was jointly planned and executed by CORAL and UNEP during this same time. The workshop was designed to review local reef threat assessments identified by industry stakeholders and MPA managers in the previous workshop and identify, plan, and implement community-based conservation projects that reduce these threats. Partners made a concerted effort to time these workshops with the culmination of the standards development process, so as to generate momentum and build capacity in the region for implementation of the standards and the code of conduct. In the summer and fall of 2006, a major outreach effort was made to recruit companies for testing and implementation of the standards. A total of 44 companies from across the region signed a letter of agreement to work with CORAL in an official capacity with this program. It is expected that the program—ending December 2007—will provide a significant amount of data and anecdotal responses that reflect changes in industry practices, measure the effectiveness of the standards, and provide guidance for the future direction of the project.

While the project was successful in achieving its goals, challenges were faced along the way that required adaptive management and creative solutions. For example, use of the online technology provided by Underwriters Laboratories appeared to dampen the expected level of

participation by committee members throughout the region. In response to this challenge, partners conducted several trainings throughout multiple sites in the region so stakeholders gained familiarity and comfort with use of the system.

3. Major Outputs/Results – Impacts in the Region

The current section provides a narrative description of project results up to the end of the project and the impacts these have generated in the region. It also describes the potential opportunities for continuation beyond the life of the ICRAN-MAR project. For a summarizing table of project indicators and status, please refer to the indicators section of the executive summary in this report.

A) MAJOR OUTPUTS:

- Workshop trainings in three project pilot sites (Placencia-Belize, Roatan-Honduras, Playa del Carmen-Mexico). In each pilot site, workshop trainings improved the capacity of the destination to address coral reef threats by increasing awareness of reef ecology and sustainable business practices, improving local capacity for collaborative coral reef conservation efforts through technical and financial assistance, and providing both a process and end product (standards) which will lead to implementation of a code of conduct for marine tourism operations.
- Production of tourism guidelines (English and Spanish) for diving, whale watching, underwater cleanup, snorkeling, turtle watching; over 50,000 disseminated throughout the region. See Annex 16.
- Development, unanimous approval and publication of three marine recreation standards (scuba, snorkeling, and boat operations) See Annex 17.
- Pilot sites' capacity improved to address sustainability and reef conservation issues through educational and highly interactive workshops, as well as technical and financial support for locally-led conservation initiatives. In each pilot site, pioneering partnerships are improving infrastructure and collaborative relationships that lead to adoption of better business practices and improved marine protected area management.
- Disbursement of micro-grants and technical support for locally led conservation initiatives in three pilot sites (Playa del Carmen, Mexico; Placencia, Belize; Roatan, Honduras); oversaw implementation and completion of these initiatives
- Launching of the testing phase for standards implementation with operators throughout the region (ongoing data collection and technical assistance). See Annex 18 for objectives and methodology
- The ICRAN-Mesoamerican reef alliance was awarded the "Best Environmental Initiative of 2005" by November 2005 issue of the Scuba Diving Magazine.
- Nearly 45 marine recreation companies in 13 destinations across the region partnering with CORAL to test the effectiveness, affordability, and attainability of the standards.
- Leveraging of resources and expansion of program to new pilots sites (Cozumel-Mexico, San Pedro-Belize). Completion of *Sustainable Marine Recreation and Conservation in Action* (series #1 and #2) workshops in these sites.
- Secured commitments from major tourism promotion institutions in each region to highlight businesses participating in the program through press releases, written stories on the web and in tourism publications. These include the Promotional Trust of the Riviera Maya, The Belize Tourism Industry Association, and the Belize Tourism Board.

- Partnerships with several companies throughout the region collaborating with CORAL to utilize the good practice guidelines to educate both staff and visiting tourists at their facilities and on their boats. Three of the largest marine recreation providers and one NGO of Quintana Roo, Mexico (including Scuba Caribe, Xel-Ha, and Xcaret – marine recreation providers; Centro Ecologico Akumal - NGO) have created a poster size copy of the good practices guidelines (including their logo) and have them on display at their respective facilities. Given the size of these companies, CORAL estimates 2 million tourists a year are being educated by these guideline displays.
- Six National learning workshops completed in Mexico, Belize, and Honduras; three at the beginning and three culminating phase one of the ICRAN-MAR project.
- Expanded ICRAN MAR program through launch of Environmental Walk-Through program in Cozumel, Mexico
- Expanded ICRAN MAR program by replicating standards development process in Hawaii, USA.
- Development and current implementation of an *Environmental Walk Through* (EWT) program in Mexico and Belize as a direct outgrowth of the ICRAN-MAR standards development process throughout the region

Intermediate steps for achieving these outputs also included:

- Dissemination of the English and Spanish version of the “Practical Guide to Good Practice: Managing Environmental Impacts in the Marine Recreation Sector” at the National Workshops. See Annex 19 and 20.
- Development of online computer software for standards development with support from Underwriters Laboratories. Software translated into Spanish.
- CORAL, WWF and UNEP/DTIE facilitated the creation of Taskforce Groups for the elaboration of Codes of Conduct in three countries.
- Completion of final report on surveys of current industry practices in Mesoamerica
- Securing endorsements for project support from the office of the Secretary of Tourism in Quintana Roo, Mexico

B) SCOPE OF RESULTS/IMPACTS – RELEVANCE OF OUTPUTS TO THE REGION

Results achieved under this tourism component provide evidence of the relevance of conducting this work for the benefit of the MAR.

Since the inception of the ICRAN Mesoamerican Reef Alliance project, promotion and adoption of good practices supporting economic and environmental sustainability in the marine tourism arena across the region has improved rapidly. In 2004, virtually no work had been attempted on the regional level to engage stakeholders in a participatory process that would lead to the development, and eventual implementation, of good practices, standards and an overall code of conduct for marine tourism. The project made notable gains in this area. While there is still a tremendous amount of work to be done to ensure region wide buy-in and implementation of good practices, it is essential that this work be coupled with the development of conservation alliances that reduce threats, support effective marine protected area management, and share benefits with local communities. The publication of the *Voluntary Standards for Marine Recreation: Scuba Diving, Snorkeling, and Boat Operations* as a compiled Code of Conduct

represents the culmination of a pioneering grassroots conservation effort within the marine tourism and conservation sector in Mesoamerica.

The primary focus of the work with communities was (and continues to be) through execution of training workshops, participatory development of standards, and disbursement of microgrant funds and technical support for locally led conservation initiatives. While each project pilot site has unique problems and needs, the common thread which unites them is recognition by stakeholders of the existing threats to their reefs, and a common desire to work collaboratively to address these threats. In all sites, evidence shows that, prior to the training workshops, there was a very limited understanding of issues such as reef ecology, sustainable business practices and marketing conservation. Additionally, stakeholders in each site showed limited experience and ability to work collaboratively on local conservation initiatives. Following the project's Sustainable Marine Recreation and Conservation in Action training series, stakeholders showed a strong understanding of the threats their reefs are facing, and have a basic understanding of how, as an industry, they can organize themselves and work collaboratively to address these threats.

Evaluations of the *Sustainable Marine Recreation* workshop trainings show that the project raised awareness on the issue of sustainable tourism and increased knowledge by stakeholders in the areas of ecology, reef threats, and development of action plans for locally led solutions. Most impact and change of behavior is evident in the pilot sites, notably Placencia and Roatan, and to a lesser but still significant extent in Playa del Carmen. As partners executed the trainings in San Pedro and Cozumel in early 2007, they began to see behavior changes in these destinations as well.

Additionally, the *Conservation in Action* workshop series improved the capacity of local stakeholders to work collaboratively on reef conservation initiatives and implementation of standards and an overall code of conduct. Partners could see the effectiveness of these trainings manifest in the region as stakeholders in each pilot site worked (and will continue to do work) collaboratively in pioneering partnerships to execute conservation initiatives funded by the project partners.

Local conservation projects that were funded through this project at the selected pilot sites have increased industry-based stewardship of natural resources on a broad scale. This is clearly evident, particularly in the case of Belize, where industry has offered matching funds in order to execute the selected conservation projects on a larger scale. It is also paving the way for the development of further conservation initiatives throughout the region which in turn has led to and will continue to lead to an increase in the "on-the-ground" coral reef conservation throughout the region.

In total, project partners CORAL and WWF disbursed nearly USD \$60,000 across three pilot sites: Playa del Carmen, Mexico; Placencia, Belize; and Roatan, Honduras. CORAL disbursed additional funding for local conservation projects in Cozumel, Mexico (USD \$20,000) and San Pedro, Belize (USD \$15,000). Local project partners on-the-ground realized tremendous success in all three destinations by June 2007 (See Annex 21 – Final narrative microgrant project reports).

Selected projects in three original pilot sites:

Playa del Carmen, Mexico

- 1) Mooring buoy program

- 2) Mooring buoy maintenance program

*Placencia, Belize*²⁵

- 1) Mooring buoy project
- 2) Mooring Buoy Maintenance and Financing Program

Roatan, Honduras

- 1) Marine park infrastructure program
- 2) Marine education program

Additional sites:

Cozumel, Mexico

Cozumel stakeholders are instituting a training program which will utilize the standards to train operators and park staff on sustainable business operations and methods for minimizing environmental impacts. The goal of the program is to reduce user impact on the reef and raise awareness and a sense of reef ownership within the wider Cozumel community.

San Pedro, Belize

- 1) Local education program (to raise awareness of best practices and maintain healthy coral reefs by providing packets of information to every classroom in San Pedro.)
- 2) Mooring Buoy Program (to install multiple mooring buoys along the coast of San Pedro to reduce anchor damage to coral reefs and better manage boat traffic and diver impacts.)

These local projects have been instrumental not only in supporting conservation activities but also in highlighting the relevance and applicability of the ICRAN-MAR tourism standards. Communication between shops and the marine park authorities has ensured that standards are met and maintained, with dive professionals acting as additional watchdogs. Likewise, community involvement has greatly increased in the past months, not only with those in the dive industry and fishermen, but with other marine users and local schools.

In recent months the Roatan Marine Park was instrumental in the creation of the Fishermen's Alliance, an official entity which works alongside the Marine Park to help conserve Roatan's reef. This has helped forge a partnership between divers and fishermen, reducing conflicts and confrontations. *Boat operational standards* have been introduced in the meetings and the Alliance intends to develop their own fishing moorings, FADs, and other infrastructure to the Park.

The standards testing and implementation program was launched in December 2006 and will span until December 2007. As part of the testing process, 42 operators in 13 destinations across the Mesoamerican region who are participating, are required to fill a checklist –devised for each standard (scuba diving, snorkeling, boat operations)– which provides participating businesses with a self-assessed “score” based on the requirements of the standards. These checklists, and an accompanying regional peer review program, have allowed operators to score themselves on the level of implementation achieved with the standards, and identify gaps for needed improvements. Based on the guidelines of the program, operators have taken a voluntarily critical approach to self-assessment, versus trying to score their business in the best

²⁵ ICRAN MAR grant has been matched with a USD \$10,000 contribution from TMM, one of the largest bare boat charter companies operating in Belize.

possible light. It is expected that the data gathered from this testing phase will both identify challenges for widespread adoption of the standards, and guide the future direction of work on sustainable marine recreation in the region. (See Annex 22 for up-to-date data results)

Narrative peer reviewer reports suggest that there are different sustainability issues related to industry behavior and impacts occurring at different destinations. However, all peer reviewers (reviewers and companies assessed) reflected an increased understanding of the need to improve industry practices, backed by a shared conservation ethic among all interviewed. Testimonial from Sarah Pope and Serena Moscati, two operators based in Roatan, Honduras who travelled to San Pedro, Belize, highlight the useful nature and future need for peer review programs:

“We feel that this review has been very helpful in gaining a greater understanding of some of the global dive operator practices in place. It also helps us as dive professionals to better understand where we can make improvements within our own businesses.”

Several marine park managers throughout the Mesoamerica region have expressed a strong interest to incorporate the newly published standards and Code of Conduct into park management plans. The standards are thus going to serve as a tool that will bring the private sector and resource managers together to engage in dialogue and reach common ground on the use, application, and eventual enforcement of a Code of Conduct in MPAs. With newly leveraged resources, CORAL is currently initiating this dialogue in Mexico and Belize.

National Learning Workshops

In May and June 2007, CORAL in collaboration with WWF, led the logistical coordination and execution of three national learning workshops to culminate the ICRAN MAR project. Workshops held in Playa del Carmen, Mexico; Belize City, Belize; and Roatan, Honduras brought together diverse interest groups in the marine tourism sector, including marine recreation providers, park managers and staff, local NGOs, local politicians, and concerned citizens. In addition to generating practical outputs which will drive the future direction of this conservation effort, the workshops symbolized a high point of achievement for all involved in the standards development process and success of local conservation initiatives throughout the region.

The workshops provided an overview of the achievements of the tourism component of ICRAN MAR and generated ideas on next steps to ensure stakeholder ownership and long-term success and continuation of the initiative at the local to regional scale. Participants engaged in interactive exercises to advance implementation of the standards, learn about conservation marketing, and identify roles, responsibilities, and next steps that each sector will play in the adoption of the standards and Code of Conduct in the MAR. Moreover, local project leaders presented on the success of local conservation initiatives, challenges faced, and plans for wider community involvement and long-term success of each respective initiative. In addition to testimonials on the project from numerous individuals who attended the workshops, the outputs generated demonstrate the value of the workshop in laying a framework for future action, as well as building upon project success and momentum throughout the region.

Outreach conducted throughout the project generated positive responses across a wide array of interest groups in marine recreation. Review and analysis of evaluations of the workshops suggest that more than 95% of workshop attendees view the project positively and wanted to participate in the standards development process. This broad participation and widespread support for these draft standards is reflective of the leading role that industry is taking to

promote good environmental business practices and move marine tourism in Mesoamerica down a path of economic and environmental sustainability.

Development of Environmental Walk-Through Program

As a direct outgrowth of the ICRAN-MAR standards development process throughout the Mesoamerican region, CORAL, in partnership with Conservation International, developed the *Sustainable Marine Recreation Environmental Walk-Through Program (EWT)* to advance implementation of the voluntary marine recreation standards and Code of Conduct. The aim of the EWT is to advise marine recreation businesses on improving their environmental practices. The program provides participants with the opportunity to identify gaps in environmental performance based on widely recognized good practices, and offers advice and training to assist businesses in improving the economic and environmental sustainability of their operations (See Annex 23 for EWT participant workbook).

Initially the program is placing particular emphasis on marine recreation businesses that have contracts with cruise lines in Cozumel, Mexico and Belize City, Belize, with the goal of reducing the impact of cruise tourism in these popular destinations. CORAL plans to roll out the program with operators throughout multiple destinations in Belize in late 2007. It is expected project success will lead to engagement of the marine recreation industry in major tourism destinations throughout Mesoamerica.

4. Leveraged Support, Impacts and the Larger Scale – The Potential Way Ahead

Tourism activities undertaken with the auspices of the ICRAN-MAR project have been innovative and have created great expectation among tourism stakeholders.

- **Leveraged support**²⁶. In addition to major support received from the United Nations Foundation and United States Agency for International Development, CORAL leveraged additional financial support for the project from Oak Foundation, R.B. Toth Associates, Underwriters Laboratories Inc., National Marine Sanctuary Foundation, Summit Foundation, National Fish and Wildlife Foundation. CORAL successfully acquired resources to expand the number of pilot sites in the region where standards can be tested, partnerships and alliances developed, and conservation projects launched by locally based stakeholders.
- **Additional pilot sites.** Partners' efforts in the region led to acquisition of resources to add two new pilot sites to the project: Cozumel, Mexico and San Pedro, Belize. CORAL engaged in similar capacity building efforts in these sites, including workshop trainings, technical and financial support for locally-led conservation initiatives, and creation of incentives for standards implementation.
- **Capacity building.** Tremendous progress was made in building capacity for sustainable marine recreation in select sites in the MAR through workshop trainings, participatory development of standards, and initiation of collaborative, locally-led conservation projects. Over 300 stakeholders in the region benefited from these activities.
- **Potential for expansion.** It is both imperative and timely not only to continue, but actually to expand these efforts throughout the region. A growing number of businesses are showing interest to adopt the standards and change their day to day business practices. Additionally, park managers in each country of the region have shown a strong interest in

²⁶ See Table 1 in the executive summary for more information

creating dialogue with the marine recreation industry, and using the standards and code of conduct as a tool to maximize industry support for effective marine protected area management.

- **Catalytic effects.** This pioneering collaborative process has resulted in the widespread dissemination of a conservation and business tool that is both unique and new to the Mesoamerican region. Not only can the standards be used to improve private sector operations in marine protected areas, but supporting conservation initiatives can build the capacity of both of these groups to work collaboratively to reduce reef threats, improve effective management, and share benefits of sustainable tourism with local communities. Moreover, it is vital to build upon the initial support given to the standards from the cruise lines, as the explosive growth of this sector is causing widespread impacts on coral reefs in the region.
- **Communities and local NGOs empowered.** This project strengthened and empowered local stakeholders in current coral reef conservation educational efforts and in project design activities. Local NGOs and communities were actively engaged in capacity building efforts (trainings, educational meetings, etc.) providing the basis for the successful implementation of this component (See Figure 4 in this report).
- **Convening the industry.** Project partners convened active participation from the private sector that remained engaged in these activities since the onset of the project (See figure 4 of this report). Their participation and contributions (whether in kind or financial) was fundamental for the successful implementation of project activities.
- **Support for continuation.** The standards testing program further advances partners' ability to measure industry performance throughout Mesoamerica. CORAL is currently comparing standards testing data to data from the baseline survey of industry practices completed in summer 2005. With phase two funding already secured from the Oak Foundation, and following the completion of the standards testing program (December 2007), project partner CORAL will again conduct surveys in the region to monitor changes and overall improvement in environmental performance by the marine recreation industry. Moreover, the outgrowth of programs such as Environmental Walk Through (launched in Mexico and Belize in 2007) advances the usage and direct application of the standards in the field.
- **Replication and collaboration.** There is great potential for collaboration with other conservation organizations. In fact, Conservation International (CI) is partnering with CORAL to facilitate execution of environmental performance assessments, training, and technical assistance with marine recreation providers on the island of Cozumel, Mexico, with a specific focus on cruise industry contractors. The project has the primary goal of minimizing impacts to Cozumel's reef resulting from the rapid growth of cruise tourism on the island in recent years. While CI will engage the demand side of the tourism sector, CORAL will work directly with marine recreation providers, utilizing the ICRAN-MAR standards as the primary assessment and training tool for application of better business practices. In addition to this, the Mesoamerican Program of The Nature Conservancy (TNC – MAR Program) and CORAL will collaborate in the replication of these experiences and in using the tourism standards.
- **Beyond the MAR.** The high level of success achieved in the tourism component and the receptiveness and stakeholders' willingness to be part of these efforts have opened the door for replication opportunities in other parts of the world. CORAL is currently taking lessons

learned and identifying ways to improve the efficiency of the standards development and how to adapt it in Maui, Hawaii. Additional resources obtained from the National Fish and Wildlife Foundation in 2006 are being used to replicate the standards development process in the Hawaiian islands.

5. Lessons Learned and Recommendations

- *Cultivate industry ownership of the standards.* Partners realized early on the importance of building a sense of industry ownership in both the development and eventual implementation of the standards. To date, this has proved a very effective strategy, as many operators in the region feel that they are the ones who wrote these standards. Not only has this engendered trust and pride in the process, but it serves to break down the acrimony that often exists between industry and outside forces (government, park managers, etc.) that commonly impose rules and regulations that industry feels are burdensome. Both the grassroots process and the end product of standards development will support implementation of good practices in the region for years to come. Ultimately, the marine recreation industry needs to implement these standards and understand what the benefits will be for the marine tourism sector:
 - Healthy reefs mean a healthy industry
 - Better, safer, more environmentally sustainable operating procedures
 - Improved customer satisfaction
 - Access to markets based on consumer demand for sustainable products
- *Promote transparency throughout the process.* An effective aspect of the project's strategy has been to have a very open and transparent process in determining who would be involved in standards development, as well as how the participatory nature of the project was the guiding principle that would lead to a conservation tool which would benefit a broad set of tourism stakeholders. This transparency and openness has helped increase collaboration among groups that have had a previous history of distrust and acrimonious relationships. For example, both private industry and marine protected area managers now recognize the mutual benefit of the standards, and further, have begun to collaborate on local conservation initiatives that are building capacity for reef conservation and adoption of the standards and code of conduct.
- *Facilitate locally-based partnerships and coordination to implement standards and supporting conservation initiatives.* It became apparent early on in the project, that in each pilot site there was very little collaborative action taking place (whether within industry, or between industry and resource managers) on issues of sustainable tourism and reef conservation. Combined with the participatory nature of the standards development process, the action plans for standards implementation and conservation initiatives that were developed in each pilot site have both increased and improved the organizational ability and desire for stakeholders to work together on mutual goals. Pioneering partnerships are now making great strides in each pilot site by engaging in collaborative efforts to increase economic and environmental sustainability of the marine tourism industry.
- *Be prepared for challenges and delays in using online technology.* Problems in the use of the UL online standards technology, combined with multiple language issues and discomfort in the use of technology, hindered the partner's ability to get early traction on the standards development process. Partners learned from this by working closely with UL to fix the problems with its technology and improve usability of the system. Additionally, several on-

site trainings were conducted in the use of the online software with stakeholders in multiple sites, and this improved the level of participation in the project.

- *Utilize incentives and momentum to promote implementation.* As business people, marine recreation providers need to see a return on their investment in adopting the standards into day to day business practices. CORAL has begun to create incentives by offering businesses who participate in the standards testing program a complimentary one year CORAL business membership, which allows promoting businesses as participants in a program aimed at improving the economic and environmental sustainability of marine recreation in Mesoamerica. As companies make progress in implementing the standards, additional opportunities will arise to create incentives for marketing sustainable tourism and institutionalizing the standards and code of conduct.
- There is a strong need for creation of dialogue between different sectors, most notably the private sector and marine protected area managers. The standards for marine recreation have shown, however, that these two groups have mutual interests in protecting and conserving reefs, and in addition to improving business practices, the standards will likely serve as a bridge to improve relations between these two groups.
- There were many challenges in project execution, and as a result it was necessary on several occasions to rethink the strategy. This required adaptation of the management approach to both meet the needs of stakeholders on the ground, and adjust to working within the framework of a complex, multi-region and multi-partner project.
- It is crucial to capitalize on the projects' momentum to broaden the scope of the tourism work in a phase two. This includes:
 - Increasing industry buy-in and the number of businesses that adopt standards and good practices;
 - Working with local industry associations to institutionalize the program and further develop alliances at the local and regional levels;
 - Working with local associations to institutionalize on-the-ground outreach and education through development of a CORAL Reef Leadership Network;
 - Creating dialogue between the private sector and marine protected area managers in order to incorporate the standards into park management plans and increase effective management of protected areas;
 - Depending on the level of buy-in and adoption, work with national tourism bodies and institutions to implement standards at the policy level.

The complex structure of a multi-organizational project has represented one of the most challenging aspects of this project component. The original project document did not provide enough detail about the responsibilities and contractual obligations of each partner. Additionally, it proved to be problematic that CORAL was given the majority of resources for execution of the tourism component, with limited resources provided to WWF and UNEP for their respective roles. This left CORAL to complete the vast majority of work, often created delays in project execution, and left certain programmatic elements incomplete. And while candid conversations with partners were commonly helpful in resolving some issues of project execution, some programmatic elements remained delayed until late in the project (contributing to project delays in microgrant disbursement and less than ideal participation in standards development, testing, and attendance at the final national learning workshop),

III. PROJECT INDICATORS BY COMPONENT – FINAL STATUS

Watershed Management (Intermediate Result 1). *Partnerships created that produce relevant information and forecasting resulting in improved watershed management in areas impacting the Mesoamerican Reef*

SUB-RESULT 1.1. PARTNERSHIPS ESTABLISHED WITH THE AGRI-BUSINESS COMMUNITY RESULTING IN ADOPTION AND IMPLEMENTATION OF BEST PRACTICES.		STATUS
ACTIVITIES	INDICATORS OF SUCCESS	
Activity 1.1.1: Identification of best management practices:		
<ul style="list-style-type: none"> - Develop partnerships with major agribusiness (e.g. Chiquita) and medium and small producers whose operations are carried out in key watersheds draining into the Mesoamerican Reef <ul style="list-style-type: none"> ▪ Identify key stakeholders ▪ Maintain regular communication and conduct meetings with leading companies ▪ Jointly develop language for MoUs 	<ul style="list-style-type: none"> • MoUs (4) signed with major agricultural companies for the adoption and implementation of BMPs in agri-business 	<ul style="list-style-type: none"> • 100% Completed. Eleven MOUs already signed: Chiquita, Dole, CropLife, ULPCA-CNC from Chetumal Bay, Mexico, FHIA, AZUNOSA, ACISON, AGROTOR - Honduras, Corozal and Orange Walk sugarcane Associations, and CGA – Belize • Draft MOU with Fyffes has been reviewed and approved by the company. Pending final signature
<ul style="list-style-type: none"> - Identification of agricultural threats: focusing on the 8 key threats of each of the 4 agro-industries in the zone compared to those already documented by Rainforest Alliance - Data collection on agricultural production cycles: to understand seasonal variations and feed data into the watershed modeling process - Identify appropriate bio-indicators of agrochemical contamination in fluvial and marine ecosystems identified (this will be done in support of the MAR Project with WWF counterpart funding from the Summit Foundation). <ul style="list-style-type: none"> ▪ Bioaccumulation study conducted and Ecotoxicology workshop convening experts from leading agro industry enterprises of the region and from agro chemicals-production transnational companies ▪ Conduct agricultural surveys 	<ul style="list-style-type: none"> • Three key threats of each of the four agro-industries identified that are most damaging to the health and integrity of the MAR, compared to information already documented by Rainforest Alliance. • Key agro-chemical impacts on freshwater and marine organisms identified • Protocol for pesticide monitoring in reef organisms developed. • Long-term monitoring of Bioaccumulation foreseen with funding from the Summit Foundation 	<ul style="list-style-type: none"> • 100% completed (Herbicides, fungicides, insecticides, Fertilizers, chemicals from processing plants – Sugar and Oil Palm were identified – WWF-Ag Brochure and threat analyses published) • Monitoring protocol developed. • Four Bioaccumulation sampling conducted
<ul style="list-style-type: none"> - Inventory of agricultural practices. Review existing BMPs and develop agricultural "better management practices" handbook for 	<ul style="list-style-type: none"> • Detailed documentation of existing agricultural practices collected 	<ul style="list-style-type: none"> • 100% complete for oil palm, citrus, and sugarcane.

SUB-RESULT 1.1. PARTNERSHIPS ESTABLISHED WITH THE AGRI-BUSINESS COMMUNITY RESULTING IN ADOPTION AND IMPLEMENTATION OF BEST PRACTICES.		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<ul style="list-style-type: none"> bananas, citrus, oil palm and sugar cane - Develop specific targets for reduced impacts and identify the costs and financial impacts of implementing BMPs. <ul style="list-style-type: none"> ▪ Collect information on existing and proven better practices, agricultural practices, production and threats, the development of specific measurable standards for reduced impacts, and the identification of the costs and financial impacts of implementing BMPs. ▪ Identify innovative producers who already employ better practices ▪ Identify commodity-specific BMPs from different parts of the world that might be relevant for adaptation to the MAR eco-region (utilizing the WWF, RA and ICRAN networks) ▪ Conduct analysis on the relative impacts and costs of each of the identified BMPs 	<ul style="list-style-type: none"> • BMPs for each of the agro-industries are identified; including analysis of environmental impacts, acceptable standards and financial costs associated with BMPs. • Agricultural "best practices" selected and guidelines handbook for bananas, citrus, oil palm and sugar cane developed • Established demonstration site for implementation of BMPs in one key watershed • A constituency developed composed of local government, private and public sector stakeholders to discuss scenarios and implement "better practices" for watershed management 	<ul style="list-style-type: none"> • Cover crops established in citrus plantations in The Aguan River Basin – Honduras and Stann Creek Watershed - Belize • Cover crops established in oil palm plantation in the Ulua River Basin – Honduras • Biological control of Grasshopper within the Hondo River Basin – Belize and Mexico. • An agriculture group, including a representative from the government (SESCCO) was formed. The group is active.
<p>Activity 1.1.2: Implementation/Adoption of best practices</p> <ul style="list-style-type: none"> - Conduct an ample consultation and a regional meeting with the agro industry to determine realistic scope of work and to develop concrete and specific standards - Formalize key partnerships: Bring key participants together to review and assess the information collected and to negotiate agreements, - Encourage governments in BMP-based policy making: Begin to sensitize government officials to the value of developing BMP-based regulatory and permitting systems - Develop positive relationships with influential producers: <ul style="list-style-type: none"> ▪ Attend on-going producer group meetings in addition to face-to-face meetings with innovators, influential individuals and others that need to be brought into the process in order to facilitate the dissemination of BMPs by producers - Implement of best practices together with community initiatives and conduct monitoring within one key watershed demonstration site (determined with feedback from sub-results 1.2 and 1.3) 	<ul style="list-style-type: none"> • MoUs or formal understandings with each of the key producer groups regarding adoption and dissemination of BMPs and information about progress available on the web site. • Promotion of BMPs with at least two agribusiness and medium and small producers • Best management practices for watershed management, to be adopted by at least one key watershed • Survey of palm oil plantations and database and written report with interactive GIS map for: San Alejo Valley, Sula Valley, Northern Honduras, and Aguan River Valley. • Formal written report of findings 	<ul style="list-style-type: none"> • This is a complete and ongoing activity. MOUs have been signed and WWF is working with agribusiness partners in identifying, implementing and evaluating BMPs. • 100% MOU signed by one Palm Oil Producer • 100% MOU signed by four Sugarcane Producer • 100% MOU signed by the Citrus Grower Association, Belize and ACISON in Honduras • 100% for San Alejo Valley • 100% for Sula Valley and Aguan River Valley • 100 % (Pineapple in Belize,
<ul style="list-style-type: none"> - Compilation of data on agricultural production cycles of other 		

SUB-RESULT 1.1. PARTNERSHIPS ESTABLISHED WITH THE AGRI-BUSINESS COMMUNITY RESULTING IN ADOPTION AND IMPLEMENTATION OF BEST PRACTICES.		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<p>crops different from the five commodities under the coverage of this ongoing project.</p> <ul style="list-style-type: none"> - Research, financial analyses and documentation of BMPs on banana, sugarcane, and citrus plantations. 	<ul style="list-style-type: none"> • Report of findings²⁷ 	<p>Corn, Papaya and Vegetables in Northern Belize and Quintana Roo - Mexico</p> <ul style="list-style-type: none"> • 100% - Biological control of grasshopper in sugarcane and Cover crops in Citrus – Belize • Financial analysis for Bananas still to be finished; will be conducted after the second round of the second toxicology units

SUBRESULT: 1.2 TRENDS IN LAND USE INTEGRATED WITH SPATIAL, HYDROLOGICAL AND OCEANOGRAPHIC MODELS FOR USE IN MODELLING		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
Activity 1.2.1. Predictions of future patterns of land cover changes		
<ul style="list-style-type: none"> - Review and obtain land cover data sets and determine the most suitable classification; analyze existing and scheduled land cover maps <ul style="list-style-type: none"> ▪ Existing GeoCover LC data (LANDSAT Imagery) data available for 1990 and 2000 ▪ Existing NASA/IGBP 1-Km LAC AVHRR data set for land cover ▪ Existing SPOT 4-VGT and MODIS land cover products ▪ Scheduled USAID/NASA (2003,2004,2005) Regional and National Land Use/Forest Cover Maps (30m Landsat) and Regional and National Land Use/Forest Cover Change Maps (30m Landsat) - Make use of the SERVIR website whilst undertaking the survey of available data - Review of scientific literature and research reports on historical land use / land cover changes and potential drivers of change to determine historic patterns in the rate, distribution, and nature of land cover change in the region. - Use of statistical approaches to correlate analysis of land cover 	<ul style="list-style-type: none"> • Land use and land cover changes from 1990 to 2000 determined. • Detailed compilation of relevant regional and national policies related to land use / land cover during the past two decades • List of potential land use change drivers for each country determined • List of statistical relevant driving factors determined to be used to calibrate and validate the land use change simulation model. 	<ul style="list-style-type: none"> • Complete • Rather than undertaking a formal policy review, the datasets were selected on the basis of prior knowledge on causation and data availability. The review was not part of the original work plan or MoU. • Complete • Complete – via regression analysis

²⁷ WWF is preparing the final document and an executive summary that can be shared with broader audiences.

SUBRESULT: 1.2 TRENDS IN LAND USE INTEGRATED WITH SPATIAL, HYDROLOGICAL AND OCEANOGRAPHIC MODELS FOR USE IN MODELLING		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<ul style="list-style-type: none"> information to different environmental and socio-economic variables (such as population density, soil type, infrastructure) and determine the relevant/actual driving factors of land use change out of the set of potentially driving factors Statistical models applied to simulate future trends in regional land use/ land cover change Conduct literature review of modeling methods to combine land cover change and erosion delivery models 	<ul style="list-style-type: none"> Development and validation of an appropriate land use / land cover change model for the region Capacity in the region strengthened to undertake spatial analysis and modeling. 	<ul style="list-style-type: none"> Complete – CLUE-s model selected Complete – technical training workshop involving 25 people, plus follow up training for 2 people.
Activity 1.2.2. Definition of watersheds discharging along the MAR		
<ul style="list-style-type: none"> Conduct a detailed analysis and derive a comprehensive delineation of all the watersheds discharging to the MAR <ul style="list-style-type: none"> Use of high-resolution digital elevation data (90 or 100 m resolution) Refine preliminary watershed delineations with feedback from project partners and through corrective measures such as using improved data on river locations 	<ul style="list-style-type: none"> Watersheds larger than 25 sq km discharging along the MAR defined. Production of the first comprehensive database on watersheds for the region Delivery of results: other report(s) besides ICRAN-MAR internal reports 	<ul style="list-style-type: none"> Complete Complete A project summary report, GIS data and metadata are available on the project summary CD and on the web.
Activity 1.2.3. Hydrologic and spatial analysis of impact of land-cover change on erosion and sediment delivery		
<ul style="list-style-type: none"> Evaluate changes in erosion, sediment and nutrient delivery by watershed for all watersheds discharging along the MAR <ul style="list-style-type: none"> Analysis to be conducted through coupling of hydrologic networks and watershed boundaries through hydrologic model and Geographic Information Systems (GIS) techniques Undertake hydrologic and spatial analysis of impact of land-cover change on erosion and sediment delivery <ul style="list-style-type: none"> Currently available hydrological models and data sets will be used to explore the dynamics of water and sediment transport within the MAR 	<ul style="list-style-type: none"> Land cover change estimated for all land areas along the MAR Data sets on rivers, slope, soil type and precipitation acquired to integrate in hydrologic modeling Hydrological analysis of sediment and nutrient delivery to river mouths conducted for over 400 watersheds along the MAR. Delivery of results: other report(s)/publications besides ICRAN-MAR internal reports 	<ul style="list-style-type: none"> Complete Complete Complete Project summary report, GIS data and metadata available on project CD and on the web.
Activity 1.2.4. Model calibration		
<ul style="list-style-type: none"> Outputs of hydrological modeling and watershed assessments will be evaluated and calibrated against compiled sources and data from satellite imagery. 	<ul style="list-style-type: none"> Models calibrated to predict impacts of land cover change for all land areas along the MAR 	<ul style="list-style-type: none"> Complete. WRI and Texas A&M collaborated on model calibration.

SUBRESULT: 1.2 TRENDS IN LAND USE INTEGRATED WITH SPATIAL, HYDROLOGICAL AND OCEANOGRAPHIC MODELS FOR USE IN MODELLING		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
	<ul style="list-style-type: none"> Models refined and validated through a collaborative network, including local stakeholders. 	<ul style="list-style-type: none"> WRI collected data from partners to validate the hydrologic model.
Activity 1.2.5. Estimation of dispersion of sediments and nutrients		
<ul style="list-style-type: none"> Transport modeling conducted to estimate the extent and location of sediment and pollution dispersion plumes from river mouths Data on water chemistry to be obtained from an electronic database of riverine chemistry 	<ul style="list-style-type: none"> Dispersion of sediment and nutrients for all land areas draining along the MAR estimated 	<ul style="list-style-type: none"> Complete. Implemented by the University of Miami.
	<ul style="list-style-type: none"> Circulation model for the MAR region modified (or enhanced) to allow for modeling sediment dispersion 	<ul style="list-style-type: none"> Complete
	<ul style="list-style-type: none"> Watershed, hydrological and oceanographic models integrated such that predictions can be made 	<ul style="list-style-type: none"> Complete. The University of Miami used data from the SeaWiifs satellite to validate the circulation model results.

SUBRESULT: 1.3 SCIENTIFIC INFORMATION AND MODELING RESULTS USED TO INFLUENCE DECISION-MAKER REGARDING LAND-USE POLICIES IN ORDER TO DECREASE THREATS TO CORAL REEF OF THE MAR		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
Activity 1.3.1 Development of scenarios		
<ul style="list-style-type: none"> Scenarios of the possible and probable impacts of land use practices in MAR watersheds on coral reefs will be reviewed through a workshop process (to be held in 2006). The workshop will convene external experts and local consultants facilitating presentations, brainstorming on future scenarios, and development of scenarios and spatial illustration of scenarios Identification of regional key stakeholders to participate in the workshop In addition to sharing the information and scenarios that have been developed with the governments and NGOs partners are hoping to share the scenarios with the NASA project and regional 	<ul style="list-style-type: none"> Models applied to the MAR region, and used to produce a series of scenarios to inform and influence policy development and implementation, by illustrating the possible outcome of current trends, and by highlighting the implications of different policy decisions. 	<ul style="list-style-type: none"> Complete (3 scenarios based on UNEP GEO4 Latin America & Caribbean work).
	<ul style="list-style-type: none"> Information offered to the governments and NGOs in the region to support them in decision making. 	<ul style="list-style-type: none"> Complete – both via talks & policy oriented workshop hosting 45 people. Experts convened and workshop executed successfully.

SUBRESULT: 1.3 SCIENTIFIC INFORMATION AND MODELING RESULTS USED TO INFLUENCE DECISION-MAKER REGARDING LAND-USE POLICIES IN ORDER TO DECREASE THREATS TO CORAL REEF OF THE MAR		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
GEF focal point for climate change	<ul style="list-style-type: none"> Regional capacity strengthened by the development of a network of project partners including regional organizations. All outputs and data available through locally and regionally staff trained. 	<ul style="list-style-type: none"> Project results on CD and web; shared broadly. Project partner network developed via online e-mail list as requested at the workshop; remains active even as project ends, but uptake is not as expected
Activity 1.3.2 Strengthening of capacity within the region to undertake spatial analysis, modeling, and scenario building activities		
<ul style="list-style-type: none"> Development of a network of project partners, including a number of organizations within the Meso-American region using project outputs Data and modelling tools transferred, and training provided, to staff of institutions such as the Coastal Zone Management Unit in Belize, and other relevant partners in the region. 	<ul style="list-style-type: none"> Capacity within the region strengthened to undertake spatial analysis, modeling and scenario building activities. 	<ul style="list-style-type: none"> 25 people trained at Watershed analysis/GIS training August/06; training materials disseminated online
	<ul style="list-style-type: none"> Project-produced data institutionalized within the region through local NGOs, government institutions and universities. 	<ul style="list-style-type: none"> All project results, GIS data and metadata are available on the project summary CD and on the web. These have been distributed and adopted in region; ITMEMS, and through the SERVIR portal
	<ul style="list-style-type: none"> Analytical skills transferred used to improve watershed and coastal management long after completion of this project. 	<ul style="list-style-type: none"> Many groups have been trained in the modeling methods and some are beginning finer resolution analysis. Results have been provided to CZMAI in Belize, but they no longer have technical staff. Skills transferred - indicator cannot be further evaluated yet

Sustainable Fisheries (Intermediate Result 2) Local fishers' and cooperatives' capacity strengthened for sustainable fisheries management (through development of industry partnerships, promotion of "better practices", training in financial management, resource management and alternative income generation strategies).

SUBRESULT 2.1. COMMUNITY-BASED FISHERY MANAGEMENT IMPROVED THROUGH DEVELOPMENT OF APPROPRIATE PARTNERSHIPS WITH PRIVATE AND PUBLIC SECTOR.

ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<p>Activity 2.1.1 Promotion of "best practices" guidelines for lobster and grouper fisheries and implementation of agreements / partnerships and production of brochure with guidelines</p> <ul style="list-style-type: none"> - Develop best practice guidelines for lobster and queen conch and finfish through wide consultation with industry, government, academia, partner NGOs, other projects (PROARCA and MBRS in particular) and communities - Produce brochure featuring fisheries "best practices" guidelines, and other supplemental promotional materials (e.g. posters) to support community education efforts for the adoption of best practices - Conduct a series community meetings/ workshops throughout the region to educate on best fishing practices and to produce the guidelines - A regional sustainable fisheries taskforce of industry leaders will be created through the workshops to review and finalize the document and address any potential inter-country discrepancies 	<ul style="list-style-type: none"> • 700 Copies of plasticized cards with lobsters BFP distributed among fishermen from the four countries • 1000 Copies of the Spanish version of manual: "How to profit by practicing sustainable fishing: Lobster Fishing Practices Guidelines for the Mesoamerican Reef" distributed among Fishers from Honduras, Guatemala and Mexico • 500 Copies of the English version of manual: "How to profit by practicing sustainable fishing: Lobster Fishing Practices Guidelines for the Mesoamerican Reef" distributed among Belizean Fishers • 12 Workshops to promote lobster BFPs in the four countries 	<ul style="list-style-type: none"> • 100 % • > 100% (1130). Few copies have been kept in storage to distribute them in further workshops and meetings • 100%, electronic version was produced and distributed • 95% (11). At the end of the project, Belize fishermen attended three of these workshops
<p>Activity 2.1.2 Expanding partnerships with major seafood buyers</p> <ul style="list-style-type: none"> - Approach private sector seafood purchasing and processing companies in the region to become involved with the use of best practices. - Dissemination of promotional material presenting benefits of adopting best practices - Develop partnerships with major seafood buyers (Darden and others) 	<ul style="list-style-type: none"> • 120 Fishermen attending lobster BFPs workshops in the four MAR countries • 2 Courses to train fishermen in lobster BFPs 	<ul style="list-style-type: none"> • >100% (270): 52% from Belize, 40% from Mexico and 8% from Honduras (Guatemala does not produce lobster) • 100% One course in Banco Chinchorro (Mexico) and one course in Roatan, Honduras. It is required to train more artisan fishermen from Honduras and Belize in the use of sustainable lobster traps
<ul style="list-style-type: none"> - Approach private sector seafood purchasing and processing companies in the region to become involved with the use of best practices. - Dissemination of promotional material presenting benefits of adopting best practices - Develop partnerships with major seafood buyers (Darden and others) 	<ul style="list-style-type: none"> • 25 Fishers and/or boat owners attending lobster BFPs meetings to make changes in traps in Honduras Fleet • 95 Fishermen attending fishermen exchanges between the four countries 	<ul style="list-style-type: none"> • >100% (32) • 95% (89). It is necessary to elaborate an agenda with similar topics or problems for fishermen from the four countries

SUBRESULT: 2.1. COMMUNITY-BASED FISHERY MANAGEMENT IMPROVED THROUGH DEVELOPMENT OF APPROPRIATE PARTNERSHIPS WITH PRIVATE AND PUBLIC SECTOR.

ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<ul style="list-style-type: none"> Promote best practices and implement partnership agreements 	<ul style="list-style-type: none"> 2 Agreements to trade BFPs lobster, signed by seafood buyers and fishermen cooperatives 	<ul style="list-style-type: none"> 100 %. Fishermen from Cooperative Cozumel, who fish in Maria Elena (Sian Ka'an Biosphere Reserve) completed a temporal agreement with a private restaurant to deliver product, but they did not sign a permanent agreement. Fishermen from APESCA are preparing to sign in a future an agreement with Darden, as a second phase of the current initiative. More time is still necessary to develop the custody chain, but WWF will continue supporting this project by 2007
	<ul style="list-style-type: none"> 6 Cooperatives involved in pre-assessment MSC process for lobster certification 	<ul style="list-style-type: none"> 100%
	<ul style="list-style-type: none"> 200 Fishermen engaged in the Pre-assessment process for lobster certification 	<ul style="list-style-type: none"> >100% (255)

SUBRESULT: 2.2. COMMUNITY-BASED ECOLOGICAL AND SOCIO-ECONOMIC MONITORING IMPLEMENTED WHERE APPROPRIATE TO SUPPORT COMMUNITY ASSESSMENT AND MONITORING OF THEIR PROGRESS IN RESOURCE MANAGEMENT.

ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<p>Activity 2.2.1 Select communities as centers for Reef Check ecological and socio-economic monitoring and provide training</p> <ul style="list-style-type: none"> Communities selected in collaboration with GEF/MBRS, PROARCA; Partners to complement the MBRS monitoring as centers for RC ecological and socioeconomic monitoring Conduct training in socio-economic and natural resource monitoring and management techniques throughout the MAR. Training conducted once a year in coordination with WWF Identify and implement appropriate incentives to ensure monitoring sustainability <p>Activity 2.2.2 Trainees responsible for assessing managed areas and adjacent unmanaged areas as controls</p> <ul style="list-style-type: none"> Trainees collect information and assess their managed areas 	<ul style="list-style-type: none"> 25 individuals from each of the 4 countries trained at each Reef Check session The communities, which will serve as RC ecological and socioeconomic centers, are selected and established. 15 people from the Tourism and Fisheries Industries are trained in the RC monitoring methodology. 	<ul style="list-style-type: none"> All 100 % completed and ongoing. At least 314 community members trained
<ul style="list-style-type: none"> Trainees collect information and assess their managed areas 	<ul style="list-style-type: none"> Team leaders processing and interpreting collected 	<ul style="list-style-type: none"> 100% completed - ongoing.

SUBRESULT: 2.2. COMMUNITY-BASED ECOLOGICAL AND SOCIO-ECONOMIC MONITORING IMPLEMENTED WHERE APPROPRIATE TO SUPPORT COMMUNITY ASSESSMENT AND MONITORING OF THEIR PROGRESS IN RESOURCE MANAGEMENT.		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<ul style="list-style-type: none"> as well as adjacent unmanaged areas. Trainees assist nominated target communities through peer-to-peer exchanges 	<ul style="list-style-type: none"> data for demonstration, target and other communities Data contributed to project databases in the region as well as to the ReefBase global repository Trainees have conducted 20 standard RC surveys in managed and unmanaged areas. 	<ul style="list-style-type: none"> Data is of public domain and can be accessed through the RC global data base 100% completed - ongoing. Over 145 surveys conducted
Activity 2.2.3 Demonstration sites edit and publish existing monitoring manuals in Spanish and English		
<ul style="list-style-type: none"> Selected sites serving as monitoring demonstration sites Existing Reef Check's monitoring manuals published in Spanish and English and used by communities in the MARI and elsewhere in the Caribbean. 	<ul style="list-style-type: none"> Monitoring manuals in Spanish and English are edited, published and distributed to other communities in the MARI. 	<ul style="list-style-type: none"> 100% English version widely distributed; Spanish version released in the summer 2007

SUBRESULT: 2.3. KEY MARINE PROTECTED AREAS STRENGTHENED IN COLLABORATION WITH GEF/MBRS AND PROARCA/APM (TO DEMONSTRATE SUCCESSFUL COMMUNITY-BASED FISHERIES TO THE WIDER COMMUNITY)		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
Activity 2.3.1 Conduct at least four exchanges among CBO leaders from Mexico, Belize, Guatemala, Nicaragua, and Honduras		
<ul style="list-style-type: none"> Organize and conduct exchanges of fishers among selected demonstration sites, including ICRAN demonstration sites of Hol Chan (Belize) and Sian Ka'an (Mexico), as well as from coastal communities bordering the Cayos Cochinos Reserve and other Bay Islands in Honduras, and communities near Punta de Manabique, Guatemala; Xcalac, Mahaual and Hol Box, Mexico. 	<ul style="list-style-type: none"> 750 Copies of the Publication: "Best fishing practices in coral reefs: guidelines to gather information that support the ecosystem based fisheries management" distributed among fishermen and key stakeholders from the four countries 5 Workshops and meetings to entail fishermen and stakeholders to promote the use of EBFM in Marine Protected Areas where fisheries is important 80 Fishers and key stakeholders attending workshops on EBFM 5 Ecological monitoring campaigns with fishermen participation and staff from MPA, to determine the fish community and habitat status 5 Studies on the state of fish communities and habitats 	<ul style="list-style-type: none"> >100% (900). There are 300 copies of this manual in storage that will be delivered in further workshops and meetings >100% (9). In some MPAs, it was necessary to organize more than one meeting convening fishermen from different villages >100%. 130 fishers involved 80%. 3 campaigns have been re-scheduled due to unfavorable climate conditions and fishermen activities 800%. Same reasons as above

SUBRESULT: 2.4. LOCAL COMMUNITY MEMBER'S CAPACITY TO ENGAGE IN ALTERNATE LIVELIHOODS SUCH AS COMMUNITY-BASED TOURISM IS INCREASED		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
Activity 2.4.1 Specific training in sustainable economic alternatives		
<ul style="list-style-type: none"> - Organize and conduct trainings for selected communities / fishermen in tour guiding, including dive masters; sports fishing guides; birding and kayaking. The location of training sites will rotate among the countries and participants will be selected from all 4 MAR countries. - Conduct analysis of tourism development viability of each proposed pilot site - Conduct cost-benefit study of the investment in capacity building and the potential benefit to each proposed pilot site - Conduct capability analysis of the incorporation of trained individuals in alternative livelihoods (e.g. tourism) in the economic development of their communities, in the mid term - Conduct trainings in small business management, including finances. Market assessment skills for small businesses, and identification of sustainable economic alternatives 	<ul style="list-style-type: none"> • 1 Feasibility study on alternative livelihoods for fishermen from any country • 40 Fishermen attending financial training workshops related to the alternative livelihoods 	<ul style="list-style-type: none"> • 100% - 90% 30 Fishermen who own boats and permits to perform whale-shark watching and swimming attended the meetings • Business plans workshop developed in Guatemala with the support of FFEM; it includes fishermen from communities surrounding four protected areas
<ul style="list-style-type: none"> - Conduct trainings in small business management, including finances. Market assessment skills for small businesses, and identification of sustainable economic alternatives 	<ul style="list-style-type: none"> • 40 Fishermen spending more than 30% of their time in alternative livelihoods 	<ul style="list-style-type: none"> • 100%

Sustainable Tourism (Intermediate Result 3) *Through partnerships established with the marine tourism sector, business guidelines and better practices are refined and implemented, thus creating a sustainable industry minimizing threats to the MAR*

SUBRESULT: 3.1. REGIONAL DIALOGUES ACROSS A BROAD SECTOR OF INDUSTRY STAKEHOLDERS LEADING TO COLLABORATIVE ACTION ON EMBRACING SUSTAINABLE TOURISM		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
Activity 3.1.1 National Learning Workshops and Creating Networks for Both Suppliers and Purchasers of Marine Recreation Activities		
<ul style="list-style-type: none"> - Conduct two national learning workshops on year 1 and two on year 3, in collaboration with GEF/MBRS and PROARCA, of marine recreation providers, NGOs, community leaders, bulk purchasers of marine recreation (such as cruise ships, inbound tour operators) and coral park managers creating a network of financially invested stakeholders in sustainable tourism and management of coral reefs. - CORAL – will engage marine recreation providers and MPA managers to support and adopt best practices. - UNEP DTIE – will engage bulk purchasers, inbound operators and hoteliers on minimum standards/best practices for contracting shore-based service providers and creating service agreements. - Compile contact information on all identified groups (private sector, MPAs, government officials etc). 	<ul style="list-style-type: none"> • 1000+ compiled stakeholder contacts for the region • Examples of media citations, including news articles, radio interviews, and television stories, promoting the initiative • 200+ stakeholders attending national learning workshops and informed and sensitized on the value of coral reefs, best practices, standards and the voluntary code of conduct. • Three workshop evaluations complete and showing indicators of success. 	<ul style="list-style-type: none"> • Six total national learning workshops convened in Mexico, Belize, Honduras (2005 project launch; 2007 project culmination). • 300+ individuals, organizations, and institutions from the MAR trained and sensitized on best practices, standards, and codes of conduct for marine recreation activities, as well as on the value of coral reefs (including all national and pilot workshops; standards testing program; and Environmental Walk Through program). • Published marine recreation standards widely distributed at national workshops. • Training materials developed for the

SUBRESULT: 3.1. REGIONAL DIALOGUES ACROSS A BROAD SECTOR OF INDUSTRY STAKEHOLDERS LEADING TO COLLABORATIVE ACTION ON EMBRACING SUSTAINABLE TOURISM

ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<ul style="list-style-type: none"> - Invite all groups to workshop 1a - Mexico; 1b – Belize; 1c Honduras. Prepare and coordinate workshop for countries - Distribute Handbook and Tourism Guidelines to participants (Tourism Guidelines are for the providers to handout to their guests. - Make handbook and guidelines materials available on CORAL website to download. - Workshop 1a and 1b and evaluation complete. Follow-ups with all participants - Invite all groups to workshop 2a and 2b. Prepare and coordinate workshop 2a and 2b. Workshop 2a & 2b and evaluation complete. Follow-up with all participants - Report on indicators of success and evaluation 	<ul style="list-style-type: none"> • 	<p>workshops, including five tourism guidelines, Guide to Good Practice handbook, and Supply Chain Management handbook (all in English and Spanish).</p> <ul style="list-style-type: none"> • 1,200+ compiled stakeholder contacts for the region. • 20+ media citations, including news articles, magazine awards, radio interviews, and television stories promoting the initiative. • 125 national workshop evaluations completed, showing the following: <ul style="list-style-type: none"> • 95% of workshop participants “agreeing” or “strongly agreeing” that they want to participate in the standards and code of conduct taskforce. • 76% of respondents “strongly agreed” while the remaining 24% “agreed” that the workshops address issues that are important to the local community. • 85% of respondents who answered stated that they perceived a greater understanding of coral reef ecology following these workshops. • 92% of respondents who answered stated that the workshop motivated them to use tools, such as CORAL’s Good Environmental Practice Guidelines. • 96% of respondents who answered stated that the workshop illustrated new ways for their business/organization to work with other businesses, marine parks, marine protected areas, and non-governmental organizations. • 100% of respondents who answered “agreed” or “strongly agreed” that environmental standards and a voluntary code of conduct will benefit business and local communities in the region. • 89% of respondents who answered “agreed” or “strongly agreed” that the national workshops have motivated them

SUBRESULT: 3.1. REGIONAL DIALOGUES ACROSS A BROAD SECTOR OF INDUSTRY STAKEHOLDERS LEADING TO COLLABORATIVE ACTION ON EMBRACING SUSTAINABLE TOURISM		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
		to re-evaluate their business practices or behavior.

SUBRESULT: 3.2. CREATION OF STANDARDS AND A VOLUNTARY CODE OF CONDUCT THAT WILL BE APPLIED THROUGHOUT THE MESOAMERICA REGION AND POTENTIALLY ELSEWHERE IN THE CARIBBEAN		
ACTIVITIES	INDICATORS OF SUCCESS	STATUS
Activity 3.2.1: Develop a regional sustainable tourism code of conduct for marine recreation providers and a mechanism for its regional implementation		
<ul style="list-style-type: none"> - Identify key organizations, contacts, and get commitments from key organizations for support and create standards task group with representation from all stakeholder groups - Establish and maintain on-line standard forum in coordination with regional on-line bulletin board and install and maintain standards development groupware - Prepare draft standards - Working with standards task group and others, gain support of standards further develop and adopt - Post draft standards for public review, publicize (regional network, in-country workshop 1 series), organize comments - Compile approved standards into a regional code of conduct in English and Spanish - Report on indicators of success and evaluation 	<ul style="list-style-type: none"> • Regional standards and a voluntary code of conduct for marine recreation providers • Establishment of a library of hard copies and web-based references for existing best practices for marine recreation. • Secured contractual agreement for online standards software. • 150+ registrants on the standards and code taskforce (SCT) representing a balanced set of interest groups in marine recreation, including suppliers, purchasers and consumers, local community groups, and general interests. • Project partners trained in on-site usage and technical support for online standards software. • Composition of the standards and code taskforce reflects a balance of materially affected stakeholders from across the Mesoamerica region, and priority activities for standards development are decided upon by the SCT steering committee. • Taskforce reaches consensus around marine recreation standards and a voluntary code of conduct (will likely continue into 2006-2007). • Standards published through international standards body (will be based on the timeline of when standards committee finalizes consensus on developed standards). 	<ul style="list-style-type: none"> • 3 marine recreation standards developed and unanimously approved by Summer 2005 (scuba diving, snorkeling, boat operations); 50+ yes votes obtained across region on each standard. • Standards and Code of Conduct informs development of testing program to measure effectiveness, attainability, affordability of standards. • 44 businesses sign Letter of Agreement with CORAL for participation in standards testing program (January 2007). • 22 businesses submit self-evaluation data online to CORAL to date (as of June 2007). • Environmental Walk Through program (based on standards requirements) rolled out in Cozumel, Mexico. • Library of examples of best practices provided to stakeholders at national and first pilot workshops. • Pro-bono contract secured for use of collaborative standards development software with Underwriters Laboratories. • Standards development trainings on use of CSDS held in Belize and Honduras (training pending in Mexico for January 2005). • 191 members recruited on standards and code taskforce, representing tourism associations, marine recreation

		<p>providers, park managers, tour operators, NGOs, academics, local community groups, among others.</p> <ul style="list-style-type: none"> Standards development process initiated on CSDS in November 2005 – completed in July 2006..
<p>Activity 3.2.2: Handbook for Bulk Purchasers of Marine Recreation and Guidelines for Tourists</p>		
<ul style="list-style-type: none"> Reprint CORAL tourist guidelines in English and Spanish in coordination with GEF/MBRS and PROARCA Collaborate with GEF/MBRS on the “best practices” guidelines for MAR Market the Handbook (to be printed by UNEP-DTIE in English and Spanish and guidelines through workshops and regional network and use for pilot sites etc. Report on indicators of success and evaluation 	<ul style="list-style-type: none"> Guide to Good Practice for marine recreation providers and guidelines for tourists. Handbook published in English and Spanish and supplied to all participants of national level and pilot site workshops, with 200+ copies left in each region for follow up distribution. Tourism guidelines published in English and Spanish with 40,000 copies made available at national workshops and 10,000 left in the region for follow up distribution. 	<ul style="list-style-type: none"> 100% completed. Handbook published in English and Spanish and distributed at national and pilot site workshops, as well as through general outreach 100% completed. 50,000 + guidelines distributed through national and pilot workshops and through general outreach

SUBRESULT: 3.3. TRAINING AND SUPPORT FOR ADOPTION OF THE CODE OF CONDUCT COMPLETE, LEADING TO THE PRIVATE SECTOR IN THE MAR BEING FULLY ENGAGED IN THE PRACTICE AND PROMOTION OF SUSTAINABLE MARINE TOURISM

ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<p>Activity 3.3.2: Pilot Testing Training and Technical/Financial Assistance Program to improve adoption and compliance of Code of Conduct</p> <ul style="list-style-type: none"> Discuss pilot projects and present at pilot workshop series 1 Gather MPA and stakeholder support and select 3 pilot sites Create training materials in Spanish and English Compile contact information on marine recreation providers and bulk purchasers to participate in pilot projects Pre-study evaluation on coral reef health and industry practices Training 1 for pilot site 1, 2, and 3 and evaluation complete with both purchasers and providers Provide technical support and advice for providers and purchasers – continual Training 2 for pilot site 1, 2, and 3 with providers and MPA and evaluation complete Identify projects with pilot sites and provide additional technical and financial assistance Training 3 for pilot site 1, 2 and 3 with providers and MPA and evaluation complete Post - study evaluation on coral reef health and industry practices 	<ul style="list-style-type: none"> Compilations of baseline data reflecting pre and post-surveys analyzed and findings published and presented. 50% of marine recreation providers that attend workshops provide feedback, and adhere to standards and the voluntary code of conduct. Successful completion of initiative-funded conservation projects that support implementation of standards and the voluntary code of conduct. 	<ul style="list-style-type: none"> 6 total workshop trainings on Sustainable Marine Recreation and Conservation in Action held in original pilot sites (Playa del Carmen, Mexico; Placencia, Belize; Roatan, Honduras). 4 total workshop trainings on Sustainable Marine Recreation and Conservation in Action held in newly leveraged pilot sites: Cozumel, Mexico and San Pedro, Belize. 3 local conservation initiatives successfully completed in original pilot sites. 3 conservation initiatives launched as follow-up to original initiatives in pilots sites. 2 new local conservation initiatives launched in newly leveraged pilot sites. Full report on pre-survey of industry practices published in January 2006.

SUBRESULT: 3.3. TRAINING AND SUPPORT FOR ADOPTION OF THE CODE OF CONDUCT COMPLETE, LEADING TO THE PRIVATE SECTOR IN THE MAR BEING FULLY ENGAGED IN THE PRACTICE AND PROMOTION OF SUSTAINABLE MARINE TOURISM

ACTIVITIES	INDICATORS OF SUCCESS	STATUS
<ul style="list-style-type: none"> - Report on indicators of success and evaluation and lessons learned 		<ul style="list-style-type: none"> • Testing data on effectiveness, attainability, and affordability of standards compiled in June 2007. • 50 workshop evaluations completed, showing the following: <ul style="list-style-type: none"> - 76% of respondents “strongly agreed” while the remaining 24% “agreed” that the workshops address issues that are important to the local community. - 57% of respondents “strongly agreed” while the remaining 43% “agreed” that they can increase their business by using and marketing sustainable approaches. - 51% of respondents “strongly agreed” while the remaining 43% “agreed” that the <i>Threats Ranking</i> activity was helpful. - 56% of respondents “strongly agreed” while 42% “agreed” that the <i>Solutions</i> activity was helpful. 2% of respondents who answered “disagreed” that the <i>Solutions</i> activity was helpful. - 44% of respondents “strongly agreed” while 51% “agreed” that the workshop motivated them to re-evaluate their business practices or behavior. 4% of respondents who answered “disagreed” that the workshop motivated them to re-evaluate their business practices or behavior.

IV. TABLE OF ANNEXES

Annex 1	Tables - Participation of various organizations by country
Annex 2	MoUs with Agribusiness
Annex 3	Letter of commitment Local Union of sugarcane producers, Chetumal
Annex 4	Contaminant Monitoring Protocol
Annex 5	Former Agreement with Honduran Ministers in support of BMPs
Annex 6	Technical report on Land use change modeling for three scenarios for the MAR region
Annex 7	Belize Coastal Atlas
Annex 8	Watershed Management Workshop proceedings
Annex 9	Watershed Analysis for the Mesoamerican Reef; Report
Annex 10	Lobster Manual – Spanish
Annex 11	Lobster BFPs – Plasticized cards
Annex 12	Best Fishing Practices in Coral Reefs – EBFM Manual
Annex 13a	Reef Check's Monitoring Protocol – English
Annex 13b	Reef Check's Monitoring Protocol – Spanish
Annex 14	Whale-shark swimming report
Annex 15	Reef Check Monitoring findings
Annex 16a	Tourism Guidelines – English
Annex 16b	Tourism Guidelines – Spanish
Annex 17a	Marine recreation Standards – English
Annex 17b	Marine recreation Standards – Spanish
Annex 18	Methodology Standards Testing
Annex 19a	Practical Guide to Good Practice: Managing Environmental Impacts in the Marine Recreation Sector - English
Annex 19b	Practical Guide to Good Practice: Managing Environmental Impacts in the Marine Recreation Sector - Spanish
Annex 19c	Practical Guide to Good Practice: Managing Environmental Impacts in the Marine Recreation Sector - French
Annex 20a	Marine Checklist – English
Annex 20b	Marine Checklist – Spanish
Annex 20c	Marine Checklist – French
Annex 21	Micro-grants Project Reports - Tourism
Annex 22a	Standards testing data results - Scuba
Annex 22b	Standards testing data results - Snorkel
Annex 22c	Standards testing data results – Boat Operations
Annex 23	Environmental Walk-Through Program (EWT) handbook

Other documents available upon request:

- Project promotional flyers
- Press releases and other promotional materials
- Letters of endorsement
- Best Environmental Initiative - Scuba Diving Magazine November 2005
- Distribution lists – publications
- Workshops' individual reports
- Tourism National Learning workshops – individual workshop outputs
- Tourism industry survey report
- CSDS Tutorial Development of Standards
- Circulation modeling report – Dynamics of buoyant matter in the MAR