



Caribbean Large Marine Ecosystem (CLME) Project

CLME Full Project component 4: Reef Fisheries and Biodiversity pilot project

Prepared by
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1 Background

Coral reefs in the region are essential to fisheries and tourism, two of the main industries in the region. Coral reef fisheries provide an inexpensive source of protein and employment where sometimes other options are scarce. The increasing amount of tourism in the region also generates an increased demand for fish and marine products from restaurants and hotels in tourist areas, where chains of suppliers from predominantly artisanal, small-scale, subsistence fisheries provide their catches to local markets. The export markets in some countries also provide a significant amount of income from reef fisheries.

Reef fisheries are generally “open access” fisheries, with few regulations (either insufficient or just poorly enforced) to protect the resources from over-extraction. Overfishing not only affects the size of harvestable stocks, but can lead to major shifts, direct and indirect, in community structure, both of fish species and reef communities as a whole (Roberts, 1995.) Larger individuals (which also has greater reproduction output) are targeted which affects the viability of a population, and in addition to changes in the abundance, composition and demography of targeted reef fish populations, noticeable changes in the structure of coral reefs have also been documented where e.g. over extraction of predatory fishes may result in the increase of other less commercially valuable species. In addition, the accelerated bioerosion of corals can occur as the invertebrate fauna is no longer controlled by their natural predators, and overfishing of herbivorous fishes results in overgrowth of coral reefs by algae. Overfishing can also lead to losses in biodiversity, and affect the abundance of species with critical roles in the ecosystem. This may also lower the resilience of the reef to other threats such as pollution and the ability to recover after natural disturbances such as tropical storms. Various fishing methods can also cause mechanical damage as well as being unsustainable and wasteful through e.g. “ghost-fishing”.

Ocean circulation connects coastal ecosystems and marine populations of the region, although local gyres generate local retaining systems creating ecoregions not well defined yet. While some research has been conducted on the connectivity of marine resources in the region and in particular on the transportation and replenishment of larvae and juvenile stages between areas (Cowen et al., 2002, 2004, 2006; Paris and Cowen, 2004; Paris et al., 2002, 2005; Bustamante and Paris, 2006, and many others¹), there is a need to identify

¹ Colin, P.L. 2004. Connectivity in the Caribbean Region. Are small reef fishes "Living Tracers of Connectivity"?
Keynote address. 57th Annual Meeting of the Gulf and Caribbean Fisheries Institute, St. Petersburg, Florida,
November, 2004

Cowen, R.; C. Paris, D.B. Olson and J.L. Fortuna. 2002. The role of long distance dispersal versus local retention in replenishing marine populations. *Gulf and Caribbean Research Supplement*,

Cowen, R.K., C.B. Paris and A. Srinivasan. 2006. Scaling of connectivity in marine populations. *Science*, 311: 522-527.

Paris, C.B., R.K. Cowen, K.M.M. Lwiz, D Wang, D. B. Olson. 2002. Multivariate objective analysis of the coastal circulation of Barbados, West Indies: implication for larval transport. *Deep-Sea Research*, 1 (49): 1363–1386

areas linked to each other to efficiently estimate populations and identify areas that are dependent on local management measures to secure biodiversity and fisheries as well as areas that are dependent on an external or upstream supply of larva (Cowen and Paris, 2006). Management would here be dependent on transboundary cooperation and international coordination. Land-based sources of pollution also presents a threat to marine resources and the ecosystems they are dependent upon such as coral reefs, mangroves and seagrass beds that are important nurseries and breeding habitats at some stage of the lifecycle for many marine organisms.

The Reefs at Risk indicator for the overfishing threat (Burke and Maiden, 2004) identified highly populated areas and areas where coastal shelves are narrow (such as in the Eastern Caribbean) as being under high threat, based on the relatively small fishing area and the large numbers of fishers. In the region as a whole, the study identified about 60 percent of reefs as threatened by overfishing (with about 30 percent each under medium and high threat). As illegal fishing or external fishing pressure were not included, the results underestimates the severity of overfishing. The study further noted that effective coastal resource management along densely populated coastlines is essential. An ecosystem approach to fisheries recognizes that fisheries resources are dependent on the ecosystem in which they occur. It has been estimated by the World Resource Institute that if degradation of coral reefs continue, by 2015 the loss in gross revenues per year from fisheries could be close to US\$300 million and from tourism up to US\$600 million. Within the next 50 years there would also be a loss in gross revenue from shoreline protection provided by the reefs in the order of US\$140-420 million and net benefits in total could be reduced by US\$350-870 million. (Burke and Maidens, 2004).

To be able to plan and put into effect management measures for effective coastal resource management, socio-economic analyses are also essential to tailor conservation measures and present them in a context that is clear to actors and stakeholders at various levels.

Paris, C.B., and R. Cowen. 2004. Direct evidence of a biophysical retention mechanism for coral reef fish larvae. *Limnol. Oceanogr.*, 49(6): 1964–1979

Paris, C.B., , R.K. Cowen, R. Claro, K. C. Lindeman. 2005. Larval transport pathways from Cuban snapper (Lutjanidae) spawning aggregations based on biophysical modeling. *Mar. Ecol. Prog. Ser.* 296: 93-106.

Bustamante, G. and C. Paris. In press. Marine World Heritage Sites in the wider Caribbean: how research data on biological connectivity can document the “outstanding universal value” of new nominations. Marine Sanctuaries Conservation Series, NOAA. Presented at the 59th Annual Meeting of the Gulf and Caribbean Fisheries Institute, Belize City, November, 2006

Management options

One management option proposed to combat over-fishing is the establishment of **marine reserves**, also referred to as *fishery replenishment areas* and *marine wilderness areas*. A *marine reserve* is one type of coastal and marine protected area that constitutes an *area closed to consumptive usage*, thus offering targeted and non-targeted species a spatial form of protection. They are designed to provide a **spatial refuge** that affords protection to habitats and species by eliminating fishing, harvesting, and other types of extractive activities such as mining and oil extraction. The **spatial refuge** protects marine populations from harvesting, while more traditional fisheries management methods attempt to provide a **numerical refuge, which** allows a portion of the population to escape harvest. The latter incorporates size limits, fishing quota, gear restrictions, and/or closed seasons, which can result in compliance and enforcement challenges; the former strategy relies on a unique or representative ecosystem that is set aside for non-consumptive usage within geographically defined boundaries. Similarly, spatial refuges will not be effective as a source of fish to the surrounding area if fish harvesting is not well regulated and the regulations are not properly enforced.

Financial and other incentives can encourage sustainable fishing practices, while fines and penalties discourage illegal fishing and other breaches of sustainable practices. Licensing fishers can help limit access to fisheries that are at risk for overfishing. All tools are important and need to be integrated in a comprehensive coastal-watershed integrated management plan that allows for habitat and population sustainable use. The potential benefits of marine reserves are extensive and are the subject of numerous recent reviews (Roberts and Polunin 1991, Dugan and Davis 1993, Rowley 1994, Roberts et al. 1995, Sanchirico 2004²; and others). Hypotheses concerning the effects of marine reserves on targeted species and marine ecosystems are as follows:

- Increase the abundance (density) and average size of exploited species;
- protect biodiversity, in terms of species richness, particularly for species vulnerable to fishing;
- maintain fishery sustainability;
- provide migrants to surrounding areas;
- enhance fecundity by conserving more natural size distributions;
- export larvae to surrounding areas, due to the conservation of spawning stock biomass;
- protect the genetic diversity of stocks;
- and provide biological reference areas and are of paramount importance in determining the effects of fishing on populations, communities.

The strategy of using MPAs as a conservation tool has been furthered not only by local conservation organizations, but also by international organizations and treaties. The SPAW Protocol of the Cartagena Convention -the precursor of the Convention of Biological Diversity in the Caribbean, assist MPAs through the Caribbean Marine Protected Area Managers Network and Forum (CaMPAM) consisting of a number of partner organizations in the region such as GCFI, TNC, NOAA, and Environmental Defense to mention a few. During the COP-7 of the COB and the last World Park Congress dozens of governments in the region committed to create national and regional networks of MPAs by the year 2012. The World Commission of Protected Area-Marine (<http://ipo.nos.noaa.gov/mri>) implemented an expert consultation process in 2004

² Sanchirico, J.N. 2004. Designing a cost-effective marine reserve network: A bioeconomic metapopulation analysis. *Marine Resource Economics* 19: 41-65. <http://bbp.amnh.org/website/pdfs/SanchiricoMRE2004.pdf>

(Marine Reserves Regional Enhancement Plan for the wider Caribbean) to select project proposals to address the issue (research, communication, training). The selected proposals have been granted funding by several agencies (NOAA and others).

Marine Protected Areas A study compiled information on marine reserves in the wider Caribbean region (Appeldoorn and Lindeman, 2001) and noted that even though marine reserves are distributed throughout the region, gaps are evident, particularly in Hispaniola Island, the mainland coasts of Honduras and Nicaragua, the north coast of Cuba, and Panama, Colombia and Venezuela.

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The Reef and Risk study (Burke and Maidens, 2004) surveyed the level of protection of 285 designated MPAs across the 35 states and territories of the Caribbean region (existence of management activity, existence of a management plan, availability of resources, and extent of enforcement) and showed that only 6 % were rated as effectively managed and an additional 13 to have partially effective management. Therefore it should be noted that many marine reserves and protected areas in the region require assistance to meet their conservation objectives for which they were established. The authors stated that the common reasons for MPA failure were lack of long-term financial support and a lack of support from the local community, which can usually be traced to a lack of local involvement in planning and a failure to share financial or other benefits from protection.

Nevertheless, marine reserves are yet a promising tool for fisheries management in the Caribbean region. Roberts *et al.* (2001), in a temporal and spatial analysis of fish abundance and composition, demonstrated how long-established marine reserves in the U.S. Florida (Merritt Island National Wildlife Refuge) and a network of small reserves in St. Lucia (the Soufriere Marine Management Area) have enhanced catches in adjacent areas between 46% and 90%. As further evidence of the benefits of marine reserves, the Exuma Land and Sea Park in The Bahamas has served as a source of fish and conchs to the surrounding area (Sluka *et al.*, 1996; Stoner *et al.*, 1996; 1999).

Existing efforts and cooperation

There are existing programs and projects throughout the Caribbean addressing reef fisheries as well as better siting, designing, planning, and managing of marine protected areas. A great majority of these relate to habitats, ecosystems, and species populations characterization, as well as human impacts assessment. Other programs address coral reef conservation through the alleviation of conflicts between different users (e.g. commercial fishermen and tourism operators), capacity building of local communities and CBO's to manage their own resources, or for government officials in policy development or strengthening governance processes. Although these programs address some of the questions relevant to no-take areas or reef fisheries, they do not often cover the most challenging research questions such as the biological connectivity of marine populations, both large-scale (oceanic, via larvae or adult migration) or cross-shelf (seasonal and ontogenetic changes). It is, however, essential to map and recognize the contribution of those projects and the need to build upon their achievements and transfer the knowledge and experiences gained through vertical levels and into policy implementation. By mapping existing efforts and initiatives and identify gaps, targeted research can further feed into understanding the complexity of these issues.

Other approaches to alleviate overfishing have to do with the reduction of fishing pressure over the resources. Due to the increasing role of tourism in the economies of the Caribbean countries, there is a There are various actors, programmes and projects at different levels, community, local, national, subregional and international levels and linkages within levels and between levels are essential to enable a concerted action towards sustainable management, avoid duplication and delineate future actions and projects (some mentioned, more to be identified):

Sustainable fisheries components – MAR, MBRS,

Coral Reef monitoring: INVEMAR, NACRI, AGGRA, Reef Check

Conservation NGO's: TNC, WWF, CORAL, etc.

Research programmes: Universities, research centers, etc.

By strengthening MPA management, countries in the regions are assisted with their biodiversity conservation and commitment to international goals. Developing alternative livelihoods incorporating sustainable tourism activities and mariculture, would reduce the dependency on fisheries resources in selected areas and provide a more reliable source of income thereby alleviating poverty and reducing fishing pressure. Community-based monitoring of coral reefs could increase the understanding of the necessity of sustainable extraction of resource, and improved communication between stakeholders; communities, tourism industry and park management could lead to increased cooperation needed to halt the decline of the environment and its resources.

2 Objectives:

The objectives of the Reef Fish and Biodiversity pilot project are:

- To strengthen or improve the governance of fisheries and marine biodiversity management at the national, local and regional levels through the application of interactive policy cycle process at a maximum of 5 representative demonstration areas with demonstrable linkages between them at both the lateral and vertical levels;
- To contribute towards the sustainable use of fisheries and marine biodiversity as appropriate through improved existing policy frameworks and management interventions undertaken on the basis of the principles and values of governance;
- To enhance marine biodiversity conservation through the strengthening of existing marine protected areas and reserves in order for them to meet their conservation objectives.
- To facilitate the sharing of best practices on technical and governance systems based on the regions experience and the diffusion of lessons learnt

3 Activities

The following activities are proposed as being necessary to achieve the objectives described above:

- Identify potential demonstration sites for lateral linkages within and between countries. The demonstration sites can have varying needs to diversify the lessons learned, but could include:
 - Collaborative enforcement of fisheries restrictions

- Need for development of sustainable innovative fishing practices and alternative livelihoods
- Capacity building (MPA/marine reserves, fisheries cooperatives, CBOs etc.)
- Conflict resolution
- Filling in information gaps to allow for informed management decisions
- The selection of demonstration projects/sites could be guided *inter alia* by the following criteria:
 - Transboundary issues
 - Hotspots –biodiversity & reef fisheries
 - Cofinancing (3:1)
 - Building on existing initiatives and experiences
 - Strategic, replicability, sustainability
 - Participatory processes
 - Capacity building
 - Links to poverty alleviation
 - Stakeholder organization
 - Demonstrated progress/links towards meeting requirements of CBD and other regional instruments Cartagena (SPAW & LBS)
 - Identification of existing projects relevant to the needs of the demonstration sites for transfer of experiences
 - Identify gaps in linkages at various levels and promote cooperation between relevant entities
 - Identifying and engaging the full range of stakeholders in each stage of the cycle,
 - Specification of, and obtaining stakeholder agreement upon, an appropriate management cycle
 - Identification and support for meetings of an appropriate regional political forum for policy decision-making.
 - Promote participatory management and sustainable use of marine resources
 - Involving research partners to fill gaps identified by operating the cycle.

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Additional issues to be taken into account include:

- Concrete outputs and defined products (e.g. Management plans)
- Include valuation in the pilot to influence policy change
- Multi-stakeholder involvement (local, national)
- Multi-scale policy intervention analysis
- Policy lessons/gaps from existing projects (e.g., MBRS)
- Lateral and vertical linkages between components
- Identifying partners and initiatives (IYOR 2008, CLME "icing")

Potential demonstration sites

Potential demonstration sites are the Archipelago of San Andres, Old Providence, and Santa Catalina, (Colombia) and Pedro Banks (Jamaica) as described in Annex I and II. Both sites are large areas with enough variables and complexity to address lateral and vertical linkages. The two areas are also quite advanced in their own processes, with a lot of data already generated which could feed into, focus resources and facilitate design and implementation. In addition to these main areas, other sites could be identified in these two countries to link in with the demonstration sites for specific areas. Ongoing projects around the Caribbean that also could feed into the Pilot are the Sustainable Grenadines (Annex III), the Mesoamerican Barrier Reef Projects and others to be identified.

It should be noted that due to the complexity of the issues to address and the time period (3 years) resources should be focused to a limited number of sites. In addition to the demonstration sites, a parallel process could provide certain assistance to countries to strengthen management of fisheries and MPAs/marine reserves.

4 Outputs

- Demonstration projects with strengthened management cycles that identifies:
 - Processes by which policy is set, management will be reviewed, decisions taken and management implemented,
 - Roles and responsibilities of stakeholders at all levels,
 - Current and proposed linkages among stakeholders,
 - Actions to be taken by national and regional management organizations to achieve sustainable use of local and national reef fisheries resources and meet international targets (MPA networks, WSSD targets).
 - Ecosystem-based management approach for reef fisheries,
 - Information gaps that need to be filled to improve management.

4 Management structure and accountability

The project will be led by the UNEP Caribbean Regional Coordinating Unit. The UNEP-CAR/RCU will be accountable to the PRU for all funds and pilot project outputs. Implementation partners will include representatives from demonstration projects and other potential partners in the region.

5 Stakeholders and beneficiaries

Stakeholders are national governmental and regional intergovernmental management agencies, fishers and cooperatives, MPA practitioners, research institutions, tourism operators and all persons engaged in associated support activities. Beneficiaries are all who earn a living, either in whole or in part from reef fisheries and coral reef biodiversity.

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6 Long-term sustainability strategy

The strategy for long-term sustainability is foremost to develop a process that is appropriate to the value of the resource and the capacity of the participating demonstration sites and countries. It is envisaged that once the policy and management cycles have been established and operated, stakeholders will begin to appreciate their value and to recognize the benefits that can be derived. Discussions will be pursued with stakeholders to encourage them to supporting the processes required for transboundary management of coral reefs and the fisheries that they support.

7 Replicability

The establishment of a functional policy and management cycle with appropriate linkages to national and local entities as well as to regional and global cycles will provide an example that can be adapted to other sites for sustainable management of reef fishery and biodiversity resources.

8 Monitoring and evaluation

A programme of monitoring and evaluation will be developed based on GEF indicators for resource status, governance processes and environmental pressures.

9 Cofunding

| Partner | Role | In-kind | Cash |
|------------------------------------|--|---------|------|
| UNEP-CAR/RCU | Overall coordination of pilot project | | |
| CERMES | | | |
| MBRS, ICRAN-MAR and other projects | Technical inputs | | |
| Demonstration sites | Pedro Banks | | |
| | San Andres | | |
| | | | |
| Countries | Participation in process and implementation of decisions | | |
| Fisher organizations | Participation in process | | |
| | | | |

ANNEX I

San Andres Archipelago Seaflower Marine Protected Area (MPA), Colombia:

The Archipelago of San Andres, Old Providence, and Santa Catalina, Colombia, is in the western Caribbean. It includes three small inhabited islands and a number of uninhabited cays. The largest island, San Andres, is 800 km northwest of Colombia. Old Providence and Santa Catalina are 80 km north of San Andres. The territorial waters are about 300,000 km², nearly 10% of the Caribbean Sea. The coral reefs are among the healthiest in the Americas with barrier and fringing reefs, atolls, lagoons, and less defined coral banks extending over 500 km.

To sustainably manage these globally significant ecosystems and biodiversity, a multiple-use marine protected area (MPA) has been put in place. The Seaflower MPA is part of the Seaflower Biosphere Reserve, declared in 2000 by UNESCO, and includes coral reefs, atolls, mangroves, seagrass beds, beaches, and deep water. The MPA is zoned for management levels ranging from total conservation to controlled commercial fishing. It covers 65,000 km² and is divided into three administrative sections: Northern 37,522 km², Central 12,716 km², and Southern 14,780 km².

The Minister of Environment, Housing, and Territorial Development declared the MPA in 2005. The country's first MPA and the largest in the Caribbean, it is managed by CORALINA, regional autonomous sustainable development agency and representative of the National Environment System (SINA). MPA objectives are: 1) preservation, recovery, and long-term maintenance of species, biodiversity, ecosystems, and other natural values including special habitats; 2) promotion of sound management practices to ensure long-term sustainable use of coastal and marine resources; 3) equitable distribution of economic and social benefits to enhance local development; 4) protection of rights pertaining to historical use; and 5) education to promote stewardship and community involvement in management.

To realize these objectives, the MPA is zoned for conservation and sustainable use. Marine activities and the health of marine ecosystems and biodiversity are central to economic well-being, livelihoods, food security, and cultural identity. Zoning supports diverse aims like protecting ecologically critical sites and entire ecosystems, controlling access, reducing conflicts between user groups, maintaining and recovering fisheries, promoting tourism and education, and improving research and monitoring. There are five zone types: 1) no-entry, with use restricted to research and monitoring (116 km²); 2) no-take, allowing a variety of non-extractive uses (2,214 km²); 3) artisanal fishing, for use by traditional fishers only (2,015 km²); 4) special use, for specific uses like shipping lanes, ports, and marinas or those with the potential to generate conflict (68 km²); and 5) general use, where minimal restrictions apply to preserve MPA integrity.

For effective MPA implementation activities include improving participatory management, implementing collaborative enforcement, putting in place financial mechanisms, developing alternative livelihoods and economic alternatives, carrying out technical (physical, ecological, socioeconomic) and community-based monitoring, strengthening institutions, and building community capacity. CORALINA is working to achieve these initiatives with local, national, and international partners and stakeholders. The MPA was set up with funds from GEF. Current funders include NOAA's Coral Reef Initiative, WW2BW, and Colombian national project funds and a new GEF project is being developed.

Presently the most critical issue confronting MPA management is enforcement. The Seaflower MPA was set up with an extremely high level of community participation and the community advises on management through the Stakeholder Advisory Committee (SAC) that forms part of the management structure. Fishers, divers and other water sports operators, and traditional users (native islanders) who are represented in the SAC now say that ineffective enforcement is their biggest concern and are clamoring for involvement, partnerships, and linkages to improve enforcement across institutions and stakeholders.

Other institutions with jurisdiction over fisheries include the Departmental Fishing Board, of which CORALINA is a member; INCODER; and the Secretary of Agriculture and Fisheries (also members). Those concerned with enforcement include CORALINA, the Departmental Fishing Board, Secretary of Agriculture and Fisheries, Port Authorities on both islands, Coast Guard, and Old Providence McBean

Lagoon National Park. MPA management also includes other Advisory Committees. Agreements have been formalized with the committees, and membership is as follows:

| <u>International Advisory Board (IAB)</u> | 10 | <u>Stakeholder Advisory Committee (SAC)</u> | 11 | <u>Inter-Institutional Committee (IIC)</u> | 12 | <u>Technical Advisory Committee (TAC)</u> | |
|---|---|---|-------------------------------|--|---------------------------------|---|----------------------------------|
| 13 | Memberships by individual | 15 | Representatives as indicated: | 17 | Representatives/ 1 each: | 18 | Representatives/ 1 each: |
| 14 | (Advisory support on all aspects of MPAs, when requested) | 16 | Southern Section (9) | | | | |
| | | | - Artisanal fishers – 3 | | - DIMAR | | - Minister of Environment |
| | | | - Professional divers – 2 | | - Port Captain (SA) | | - National Park Unit |
| | | | - Other water sports – 2 | | - Port Captain (OP) | | - INVEMAR |
| | | | - Traditional users – 1 | | - Coast Guard | | - INCODER |
| | | | - Marinas - 1 | | - Secretary of Fisheries (SA) | | - Departmental government |
| | | | | | - Secretary of Development (OP) | | - SENA |
| | | | | | - INCODER | | - Universities |
| | | | | | - Mc Bean Lagoon National Park | | - Port Captain |
| | | | | | | | - CORALINA |
| | | | Central Section (7) | | | | |
| | | | - Artisanal fishers – 2 | | - Education sector (SA) | | (Zoning support, when requested) |
| | | | - Professional divers – 2 | | - Education sector (OP) | | |
| | | | - Other water sports – 1 | | - CORALINA (SA) | 19 | |
| | | | - Traditional users -1 | | - CORALINA (OP) | | |
| | | | - Tourism - 1 | | | | |

Decisions are guided by and consulted with the SAC and IIC. These are standing committees that meet on a regular basis (minimum every two months) and are intrinsic to MPA management. At the request of the members, the SAC is supported by ex-officio members from the MPA project team, including but not limited to a marine scientist and a social scientist. There are also two special advisory committees that are not part of general management – the IAB and the TAC. Advice can be solicited from the IAB by CORALINA at the request of the MPA team, SAC, or IIC. The TAC advises on zoning.

Participating in the pilot on reef fisheries and biodiversity in the Caribbean Large Marine Ecosystem (CLME) Project would promote sustainable management of living marine resources by looking at a governance system of enforcement rooted in lateral and vertical linkages between Colombian local and national authorities, NGOs, the private sector (dive shops, watersports, etc), and community groups (fishers cooperatives, dive associations) as well as with similar stakeholders of other sites and of the region at large. Sustainable management of marine resources requires governance and institutional frameworks that encompass both ecoregional (the connectivity of biological populations and ecosystems) and policy (who make use of the resources) conditions. Existing projects provide financial counterpart and technical support for activities that would be carried out in as part of the CLME project pilot.

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The pilot would focus on increasing education about legal and policy aspects, zoning regulations, and institutional roles; bringing together disparate groups to seek cooperative enforcement methods, national and local authorities, authorities and users, fishers who use different gears and methods (nets, spear guns, scuba, lines, traps, etc.), artisanal and industrial fishers, fishers and watersports, and artisanal fishers and the recreational fishing industry (mainly tourism-related); investigating citizens' management initiatives, particularly in soft enforcement and surveillance; and working with stakeholders and authorities to coordinate efforts to enforce closed seasons, size limits, and other regulations that are poorly enforced.

(Add the exploration of the use of national and international (Cartagena Convention, US Lassy Act on importation of illegally caught seafood, US watchdogs NGOs, etc.) tools to address foreign illegal fishing, which will bring the connection with Jamaica and others (Nicaragua, Honduras, etc.)

ANNEX II

Pedro Bank Management Project as a partner in the CLME Reef Fisheries and Biodiversity Pilot Project.

Located approximately 50 miles or 80 kilometres south-southwest of mainland Jamaica, within the country's territorial waters, the Pedro Bank is a submerged bank three-quarters the size of mainland Jamaica (approximately 5,025 square miles or 8,040 kilometers). It is one of the biggest offshore banks in the Caribbean Basin and an important socio-economic, biological and historical area, both regionally and nationally. The Pedro Bank harbours some of Jamaica's better-preserved coral reefs and is one of the country's few remaining viable fishing grounds and an important and partially protected area of marine biodiversity, due mainly to its relative isolation (Kramer 2006). The Bank contains a variety of marine habitats including sandy shoals, coral reefs, sea grass beds, and four emergent coral cays known as the Pedro Cays. This combination of habitats support a variety of fishes, mammals, and invertebrates, while the Cays are regionally important seabird and sea turtle nesting areas (Kramer 2006). The area serves as one of the main sources of Queen Conch harvests in the Caribbean and is Jamaica's most important fishing ground, both for artisanal and commercial purposes (Aiken et al 1997; in press). Fishers have been operating on the Bank and using its small cays as a base since the 1920s (Zans 1958) and the area continues to supply over 90% of the country's conch exports and the majority of its domestic fish products.

Jamaica is the most over-fished island in the English-speaking Caribbean and its marine environment is highly threatened. As the country's major fishing grounds, Pedro Bank is currently facing significant fishing pressure and the lack of a resource management and conservation regime leaves the area extremely vulnerable to unsustainable fishing practices, foreign poaching and poor living conditions on the two cays used as fishing bases (Aiken et al in press; Espeut 2006). Large vessels from Honduras and the Dominican Republic frequent the Bank regularly and it is has been estimated that this illegal catch may be equal to or surpass Jamaica's National Total Allowable Catch (NTAC) for conch (Aiken et al, in press).

The Pedro Bank Management Project began in 2005 in order to develop and implement a plan and programme-of-action to protect and manage the Pedro Cays and surrounding reefs and in the longer term, the more extensive Bank. The project involves 6 major partners, the Pedro Bank fishing community, the Jamaica Fisheries Division, the Jamaica Defense Force Coast Guard, the Nature Conservancy Jamaica Country Programme, the National Environment and Planning Agency and the University of the West Indies, Mona.

The short and medium-term focus (2006-2009) is to build the capacity and infrastructure required for the implementation of the management plan and to further engage the fishing community and other stakeholders in early concrete actions designed to improve living conditions on the cays, foster effective collaboration and cultivate a sense of stewardship for the project and the longterm ecological and socio-economic sustainability of the Pedro Bank. Activities include the construction of a field station to serve as a pilot site for improving living conditions on the Pedro Cays and a platform for project implementation; wildlife monitoring and habitat restoration to more effectively protect Jamaica's only population and the Caribbean's largest colony of breeding Masked Booby birds as well as one of the most active sea turtle-nesting beaches in the country; providing support to the fishers to organize themselves to play an active role in determining and implementing the protection and management of the Bank's resources; improving current fishing practices and exploring innovative fishing methods towards reducing fishing pressure and improving economic benefits; and capacity-building and environmental education initiatives to develop and train natural resource stewards within the Pedro Cays fishing community and the Jamaica Defense Force Coast Guard.

All project strategies are being developed with a view to replication and further advancement elsewhere in Jamaica and in similar offshore areas throughout the region. The Nature Conservancy has committed to

developing effective, practical strategies to promote sustainable harvesting throughout the Caribbean and Pedro Bank has been selected as a pilot site. Jamaica's fisheries legislation is currently being revamped to reflect an ecosystem-based and conservation approach to national fisheries management and will require management plans for all fisheries areas. Pedro Bank will be one of the first sites to implement this regulation thereby facilitating the development and implementation of such management plans elsewhere in the country. The management plan will be based on a co-management governance model between government, NGOs and resource users requiring a collaborative, consultative and holistic approach to conservation and management geared to protect and restore the Pedro Bank ecosystem while improving fisher livelihoods.

This focus would allow the Pedro Bank Management Project to both contribute to and benefit from the CLME Reef Fisheries and Biodiversity Pilot Project as a local level partner. In addition, the project will benefit from the experiences and connection with other sites such as the Archipelago San Andres, Old Providence and Santa Catalina, with similar conditions and issues. Both sites seem to be located within the same biological connectivity unit (Bustamante and Paris, in press). This means that both may share the same fish populations.

The local level activities are already funded or can be funded from alternative sources and can be used as co financing (about US\$300,000 from 2007-2009), but CLME Project funds would be required for involvement in meetings and other activities aimed at building lateral and vertical linkages according to the CLME Governance Framework.

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ANNEX III

Sustainable Grenadines Project

The Grenadine islands lie on the Grenada Bank extending some 120 km between the main islands of Grenada and St. Vincent. There are over 30 islands, of which 9 have permanent settlements. The area of bank occupied by the Grenadine Islands is about 1,500 km² most of which is shallower than 50 m. Thus, the area supports the most extensive coral reefs and related habitats in the south-eastern Caribbean. All islands have a variety of surrounding fringing, patch and barrier reefs, and there are numerous offshore reef shoals on the bank. There are reef-related seagrass and lagoon habitats and areas of extensive mangrove forests.

Marine-based activities are the mainstay of the economy of the area. Fishing is the other major source of employment in the area and has long been a source of exports to neighbouring islands (Chakalall et al. 2005, Gill et al. in press, Staskiewicz et al. in press). Tourism is also a major source of employment and tourism development is proceeding apace. Private sector activities include: resorts, hotels, guest houses, restaurants, SCUBA dive operators, cruise ships, day and longer-term cruise operators, crafts and shops (Baldwin et al. in press).

Marine resource and biodiversity conservation are fundamental to sustainable livelihoods in the Grenadines. Unplanned development and unregulated use of terrestrial and marine habitats and resources have already led to significant degradation in many areas. There are problems with:

- Overfishing,
- Near shore habitat destruction and degradation,
- Sedimentation,
- Solid waste disposal from land and boat sources,
- Sewage disposal from land and boat sources,
- Recreational abuse of coral reefs.

The sustainable Grenadines Project is a five-year transboundary initiative (ending December 2009) of CERMES, UWI and partners funded primarily by The Lighthouse Foundation aimed at addressing issues of sustainable use of marine resources in the area³. The focus is on working with civil society to assist them in playing their role in marine resource governance. Most Project attention has been on strengthening local NGOs and is now turning towards fisheries and the role of fishers in ensuring sustainability of their livelihoods through collaboration in resource management. At a workshop last year fishers indicated an interest in becoming involved in resource management and in forming a fisher association for the Grenadines (CERMES 2006). The project will be working on meeting these requests over the next 2-3 years. It will also be working on the establishment of two MPAs in the Grenadines, the Tobago Cays Marine Park in St. Vincent and the Grenadines and the Sandy island/Oyster Bed MPA in Carriacou, Grenada.

The planned activities would allow the Sustainable Grenadines to both contribute to and benefit from the Reef Fisheries and Biodiversity Pilot Project as a local level partner. The local level activities are already funded or can be funded from alternative sources and can be used as cofinancing (about US\$100,000), but CLME Project funds would be required for involvement in meetings and other activities aimed at building lateral and vertical linkages according to by the LME Governance Framework.

³ <http://cermes.cavehill.uwi.edu/susgrenadinesIndex.html>

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A- Florida; B - N Central Cuba- Cay Sal; C - Bahamian; D. Hispaniola; E - Puerto Rico – Lesser Antilles; F- SW Caribbean; G - Continental Colombia; H - Panama-Costa Rica; I - Colombian Archipelago & Jamaica; J - Nicaraguan Rise Islands; K - Gulf of Honduras; L - Mexican Caribbean; M - NW-S Cuba & Cayman Islands; N - Campeche Bank; O - Guianan

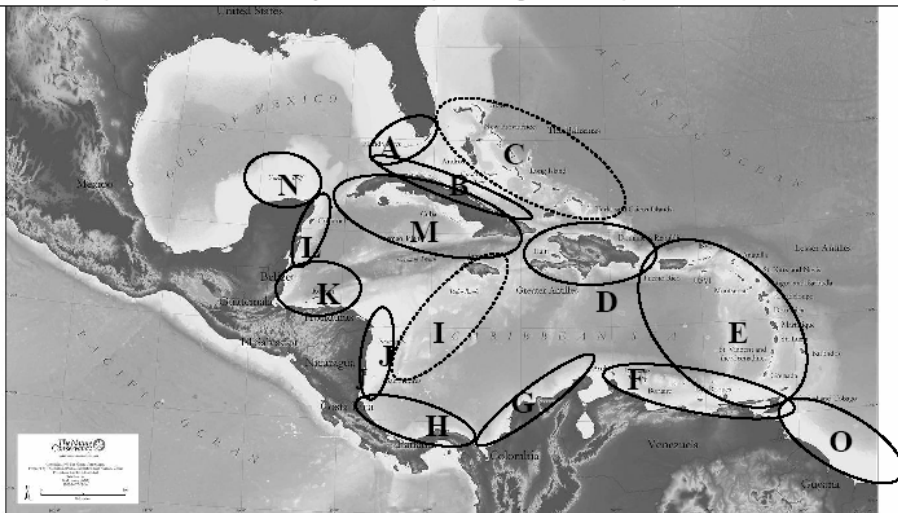


Fig. 1. Tentative units of biological connectivity (enclaves or marine ecoregions) of the Wider Caribbean, or Tropical NW Atlantic Coastal Biogeographic Province (Bustamante and Paris, in press) (ovals with dotted lines depict less documented or potential additional division)