



## **ACKNOWLEDGEMENTS**

This research has been funded by the Economic and Social Research Council (ESRC) and Operation Wallacea. The fieldwork was supported by Operation Wallacea.

Many people assisted in the collection of data during the 2009 field season. I would like to thank the research students: Amanda Wilk, Lucy Cullen, Lauren Hallworth and Andrew Dickens for their hard work and dedication to their projects. I would also like to thank the various translators who accompanied the group: Danielle Caylor, Jennifer Lucey, Sarai Fortin and Eduardo Sosa. I would also like to acknowledge the support and help of my co-researchers in Honduras: Pat Connelly, Jessica Harm, James Saunders, Lou Mallam and Tony Ives. I thank my supervisors for their continued guidance and support: Professor Ella Ritchie, Dr Selina Stead, Professor Tim Gray, Dr Tim Coles. Above all, I would like to thank the people of the Garifuna communities and key informants who were kind enough to spare their time.

Natalie Bown  
Room 260  
Ridley Building  
Marine Science and Technology  
Newcastle University  
NE1 7RU.

[n.k.bown@newcastle.ac.uk](mailto:n.k.bown@newcastle.ac.uk)  
0191 2225607

## CONTENTS

Acknowledgements	2
Contents	3
1. Aims and Objectives	4
2. Executive summary	4
3. Introduction	5-9
3.1 Practical context	5-6
3.2 Theoretical context	7-9
3.3 Structural context	10
3.4 Local context	10-13
4. Fieldwork design	10-18
4.1 Fieldwork schedule	14-15
4.2 Study sites	16-17
4.3 Research methods	18-21
4.4 Fieldwork limitations	21
5. Results	22-39
5.1 Results summary	22-23
5.2 Thematic comparative analysis of Project Objectives	24-39
5.2.1 Project Objective 1	24-29
5.2.2 Project Objective 2	30-33
5.2.3 Project Objective 3	34-35
5.2.4 Project Objective 4	36-38
5.2.5 Project Objective 5	39
6. Discussion and Recommendations	40
7. Conclusion	40
8. References	41-43
9. Appendix A: Household survey	44-53

## **1. AIMS AND OBJECTIVES**

**1.1 Aim** – To assess the effectiveness of the management plan for the Cayos Cochinos Marine Protected Area (CCMPA) using cognitive, socio-economic, and governance criteria.

**1.2 Hypothesis** – The management plan for the CCMPA, though generally beneficial in theory, has weaknesses in practice that need to be addressed.

### **1.3 Objectives**

1. To monitor the socio-economic changes of dependency on natural resources in the local Garifuna communities using a formal/informal livelihood analysis.
2. To assess the social capital and cohesion of the local communities for participation within the decision-making for the management plan.
3. To investigate the suitability of existing governance and legal frameworks for successful implementation of the management plan through a period of transition to the second management phase.
4. To evaluate the community benefits of the CCMPA through alternative employment opportunities, existing levels of tourism and associated infrastructure to explore future business opportunities.
5. To assess the potential use of the Wildlife Conservation Product (WCP) scheme to encourage community wide alternative employment opportunities.

## **2. EXECUTIVE SUMMARY**

This report summarises the findings of the socio-economic and governance assessment of the management plan of the CCMPA in 2009. Household surveys, individual fishers interviews and key informant interviews were conducted between June and August in Garifuna communities inside and on the coastal boundary of the CCMPA. The results suggest that significant socio-economic improvements have occurred in each community as a result of increased tourism opportunities, with support from several international organisations. Satisfaction with the management of the CCMPA has also increased amongst fishers as a result of a more inclusive management strategy adopted by the HCRF in the second management plan. However, a WCP driven alternative will have limited success in the communities as social capital is weak. Overall the second management plan (2008-2013) is achieving both its conservation and socio-economic objectives.

### **3. INTRODUCTION**

#### **3.1 Practical Context (updated from 2007)**

Recent studies have stated that successful management of MPAs requires socio-economic and governance criteria to incorporate the needs of local resource users alongside traditional ecological and conservation efforts (McCay and Jentoft, 2003; Jentoft *et al*, 1998; Campbell and Vainio-Mattila, 2003). However, the majority of scientific research conducted specifically in Honduras and around the Cayos Cochinos has been focused on ecological assessments of the coral reefs and associated marine and terrestrial species (Carilli *et al*, 2009; Baker *et al*, 2008; Guzman (ed), 1998; Harborne *et al*, 2001; Montgomery *et al*, 2007; Denning (ed), 2005; Almada-Villela *et al*, 2003). The most recent research published by the Global Coral Reef Monitoring Network (GCRMN) in 2008 on the status of Caribbean coral reefs reported that live coral cover was relatively low (10-15%), and macroalgae coverage was up to 19% on reef flats throughout Honduras. The report also concluded that 34% of Honduran coral reefs are threatened by anthropogenic stresses, the most prevalent being over-fishing (30%), coastal developments (25%), sedimentation from agricultural practices (10%) and marine based activities (6%) (McField *et al*, 2008). The GCRMN report also points out that enforcement of regulations and resource management across Honduras is generally considered to be weak, and most of the twelve recognised marine protected areas are not legally declared or managed.

Given the importance of the apparent effect of human behaviours in coastal regions, there has been little previous work focused on the socio-economic situation of the coral reefs in Honduras, or the governance issues within which the management operates both nationally and regionally as a member of the MBRS<sup>1</sup>. A recent regional study by McPherson (2006) focused on livelihood transitions and sustainable fishing communities in the Mesoamerican Reef Region. The report concluded that there are few job opportunities for fishers in the region, and these opportunities are not distributed evenly across the region. The main finding was that tourism related activities presented the greatest opportunity for a transition from traditional activities to alternative income generating activities. Perez (2009) reiterates the economic importance of coastal zones through fishing and tourism, and highlights the need for integrated management of biological, economic and social factors to maintain sustainability of the region.

It is now well established that to achieve sustainable coral reef ecosystems to maintain ecological and economic functions, socio-economic indicators must be included within a conservation-based action plan (Charles and Wilson, 2009; Crabbe *et al*, 2009; Mascia, 2003; Millennium Ecosystem Assessment, 2005; Cooke *et al*, 2009). Sustainability studies have identified management needs that should be combined to maintain both biodiversity and livelihoods for those immediately dependent on MPA resources. These needs include (adapted from Crabbe *et al*, 2009)

1. Ecosystem zonation that balances stakeholders needs with evidence-based fisheries conservation needs, and to implement a monitoring program for zonation effectiveness.
2. A community-based monitoring program of socio-economic change and resource dependency of local users, using both qualitative and/or quantitative research methods.
3. Co-management plans established between communities, non-governmental organisations and the state.
4. Regular meetings between all stakeholders involved in the management of the MPA.
5. Regular educational events for all communities with dependency on the resources of the MPA.
6. To encourage and maintain alternative livelihoods for fishers and communities affected by the MPA.
7. To monitor tourism development for sustainability, and to introduce penalties for unsustainable practices.
8. To regularly share information by appropriate means between all stakeholders.
9. To ensure the management plan is legal and has a legislative framework.

Importantly, one of the main objectives in both the first (2004-2009) and second (2008-2013) management plans for the CCMPA (2004-2009) was designed to assess the potential for developing

---

<sup>1</sup> A World Bank report identified the management needs for tourism development, conservation and sustainable use of the Mesoamerican Barrier Reef System, 'Latin America and Caribbean – Conservation and Sustainable Use of the Mesoamerican Barrier Reef System (2001).

sustainable incomes for the local communities who benefit from living in or around the CCMPA. In order to make this assessment, a baseline monitoring programme of socio-economic performance indicators was established to track resource dependency in each community. Research conducted in association with Operation Wallacea since 2005 has primarily focused on ecotourism and its impacts to communities within the MPA catchment area (Denning (ed), 2005; Brondo and Woods, 2006). In addition to the continuing ecotourism research, this project will provide information on these indicators to the managing agency to facilitate evidence-based decisions regarding restrictions and regulations for artisanal fishers in the CCMPA. Social capital within the communities and information sharing between stakeholders will also be examined to assess the effectiveness of the current localised governance system for the CCMPA.

It is also necessary to evaluate the appropriateness of national and regional governance for fisheries management that impacts on the CCMPA. The CCMPA is part of the 1000 km long Mesoamerican Barrier Reef System (MBRS) region which incorporates Honduras, Belize, Guatemala and Mexico (Figure 1). The MBRS has been recognised as globally important for conservation of biodiversity, cultural and socio-economic values by The Nature Conservancy (TNC, 2007). However, the ecological integrity of the region is being threatened by anthropogenic and natural factors, including coastal development, tourism development, unsustainable fishing pressure and climate change (McField *et al*, 2008). In response to the natural disturbances, management efforts are concentrated on restoring and maintaining reef ecosystem resilience. In 2004, the first Mesoamerican Fishermen’s Congress was held in Mexico as a forum for discussion on fishing cooperatives, alternative economic activities for fishers, conservation and management of certain species (conch, lobster and snapper) and regulations for fisheries. The resultant agreement from the congress was designed to facilitate the management of the participating organisations and their ability to implement fisheries policy. This was designed to harmonise some regional regulations for the use of coastal resources, i.e., restrictions on the size and material of lobster pots, which is now effective in all MPAs in the region. The congress was the first opportunity for stakeholders and managing bodies to exchange in open dialogue about the management of fisheries (MBRS, 2004). Similarly, an Action Plan was devised in 2005 where all member countries governments and associated managing agencies agreed to ‘consolidate sustainable development opportunities in the region in the areas of tourism, fisheries, management of marine protected areas, and research and education, through the rational use and conservation of barrier reef resources’ (MBRS, 2006). Therefore, this research project will provide information based on governance indicators to assess the effectiveness of the management plan for the CCMPA in achieving these agreed aims.

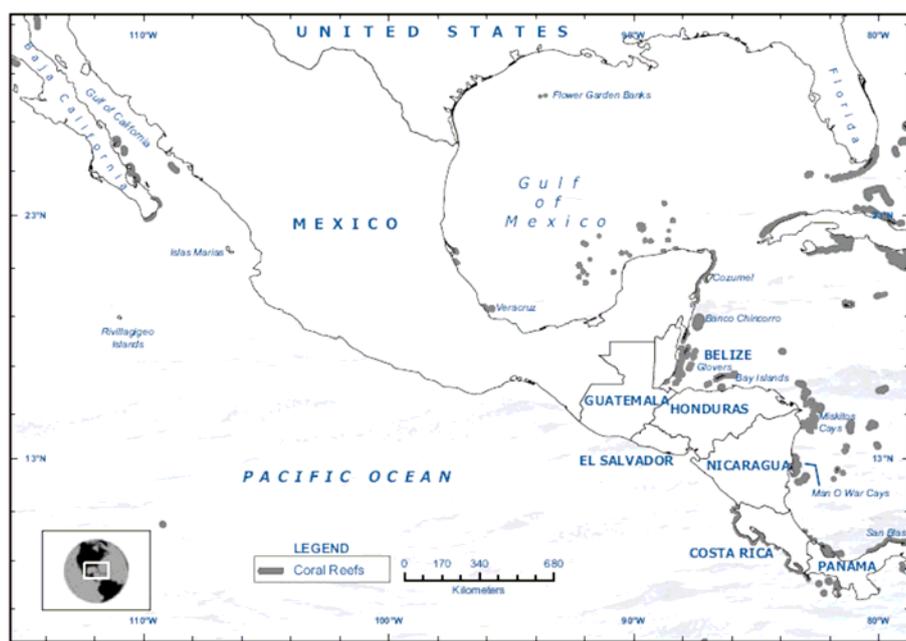


Figure 1: Mesoamerican Barrier Reef System (GCRMN 2008).

### 3.2 Theoretical Context (updated from 2007)

#### 3.2.1 Theoretical framework

The study of the behaviour of humans within a system has developed into a number of theories that explain ecosystem functioning and fisheries management. It has been argued by Levin (1999; 2005; 2006) that the repetition of specific social interactions (behaviours) over time, ideally in small-scale populations, is important for cooperation and fisheries management. In these small-scale complex adaptive ecosystems and societies, feedback loops are shortened meaning that the costs and benefits of different behaviours (trust, reciprocity, and selfishness) are evident more quickly to all members of the population. In accordance with Levin's conditions for traditionally managed fisheries, Cinner *et al* (2005) and Cinner and McClanachan, (2006) have provided evidence for the effectiveness of cultural norms as fisheries management tools in comparison with co-managed and top-down MPAs in Papua New Guinea. However, Cinner *et al* (2005) also point out the circumstances that have been essential to the success of traditional management schemes in PNG include greater distances from markets, low immigration rates of people among villages, dependency on fishing as a primary means of subsistence and effective monitoring. However, these factors can be easily undermined by increased connectivity to markets, greater movements of people, and reduced dependency on natural marine resources. This is evident in Garifuna communities where there has been a shift away from resource dependency towards remittance dependency. Where these changes have occurred, the social cohesiveness and feedback loops required to evolve and enforce social environmental norms have largely broken down (Jackson, 2007). This is the scenario that the CCMPA must be designed to deal with. Therefore, this study bases its theoretical framework in four theories to evaluate the fisheries management of the CCMPA: 1. Social-Ecological Resilience (SER) to describe ecosystem management, 2. Complex Adaptive Systems (CAS) to describe fisheries governance, 3. Common Property Resources (CPR) to describe resource governance and 4. Social Capital (SC) to describe community governance.

##### 3.2.1.1 Social-Ecological Resilience

Social-Ecological Resilience (SER) is a theory developed for the management of ecosystems and the associated social systems in the face of uncertain change. SER aims to support the ability of an environment and dependent human communities to absorb shocks, regenerate and reorganise to maintain vital functions and processes. The theory explicitly considers that ecological and social systems are intrinsically linked, and thus the resilience of each component is related to and dependent on the linkages with other components (Adger *et al*, 2005). For ecosystems, resilience can be characterised as the capacity to provide ecosystem goods and services, i.e. the maintenance of coral structural complexity, biological diversity, and local conditions to support a functioning ecosystem. For social systems, resilience can be characterised by the human adaptability to cope with changes in the availability or qualities of the goods and services provided by coral reefs to minimise the effects on social and economic well-being (Schuttenburg and Marshall, 2008).

Managing for resilience differs from traditional coral reef management because it is less concerned to maintain functions as they are today, than to emphasise the need to protect the factors that enable the system to respond to disturbance events, such as coral bleaching or hurricanes. Managing for resilience also recognises the need to manage for future changes, which directly supports an adaptive management approach. It is important to recognise that changes in natural resources will lead to changes in natural resource use patterns. Therefore, engaging with stakeholders at this time will enable managers to build alliances and gain understanding to effectively adapt management regimes to new social and economic conditions. SER recognises that where impacts on natural resources are unpredictable, cooperative, adaptive approaches to management are essential to maintain socio-economic well-being and effective natural resource management (Schuttenburg and Marshall, 2008).

##### 3.2.1.2 Complex Adaptive Systems

A Complex Adaptive System (CAS) is an interaction of different components within a system that exhibit a degree of self-organisation. The theory of CAS was developed at the interdisciplinary Santa Fe Institute to bridge systems theory and evolutionary sciences. It focuses on the patterns at higher levels that emerge from localised interactions and selection processes that are happening at lower levels. Therefore, it assesses the degree to which a system's features are determined by the governance of environmental and social conditions, or as a result of self-organisation (Levin, 1998). When a system is stable, the outputs tend to converge on stability. When the system is disturbed, the outputs are unstable, but the component parts will re-organise to form another stable solution. Given the multiple levels of a system, it is important to understand whether a system is resilient to changes in its ecological and socio-economic components, or whether it will proceed to a critical state of change.

CAS theory can be applied to fisheries governance, involving ecological, social, cultural, political, institutional and economic systems that all interact to create an interdependent resource. Each component part has some adaptive capacity, making the system more resilient to disturbance events. Provided each component responds and adapts to changes, the system will re-organise without compromise to the functioning of the system. However, should one component be unable to adapt to a disturbance, then the system may collapse. In the case of the CCMPA, changes to the social, cultural and ecological components of the system may be driving changes that are moving the system towards a critical state of change, i.e., a cultural shift away from natural resource use dependency; algal phase shift away from complex biological diversity. It should be noted that a fisheries system is not a true chaotic system (nonlinear) because it has bounding parameters, making it a complex linear dynamic system.

#### 3.2.1.3 Common Property Resource

A Common Property Resource (CPR) is a detractable resource (something that will deplete over time when under continued extraction pressure) i.e., a fishing ground that is held and used by an identifiable group of interdependent users, which excludes outsiders while regulating use by members of the local communities. Within the community, rights to access and use are likely to be equal. The rights of the user groups may be recognised legally or *de facto* (Fenny *et al*, 1998). A common property regime (*res communes*) represents private property for the group of co-owners (those that have decision-making authority) and individuals have rights to the resource. However, a common property regime is different from private property or state administration, because it is based on self-regulation by local communities (Ostrom, 2003). The group of owners and users are a social unit with definite membership and boundaries, with some interaction among members. There will often be some common cultural norms and endogenous systems of management. Within this common property regime, there are rules defining who is in the resource management group and who is excluded (Bromley, 1992). The social and political characteristics of the user groups of the resource will also affect the ability of local organisation and management of communal property.

A common property regime can break down as a result of institutional failure to control access to resources, and to make and enforce internal decisions for collective use. Pressure on a resource from external factors such as population growth, technological change or economic change because of access to new markets may contribute to the breakdown of common property regimes (Berkes, 1989). In the case of the Cayos Cochinos, following the designation of the area as an MPA, only the local communities traditionally using the marine resources had access rights to its resources. In 2009 the area has been expanded to meet with the northern coastline, preventing industrial trawling vessels from steaming past the protected area. This was done to reduce the incidence of illegal fishing in the area for commercially important shellfish species, with the aim of improving subsistence fishing conditions. So CPR theory helps us to analyse how the success of MPA governance rests critically on careful handling of property rights in natural resources.

#### 3.2.1.4 Social Capital

Social capital is a concept that refers to the ability of actors to secure benefits through membership in social networks or other social structures (Woolcock and Narayan, 2000). It provides an understanding of the willingness of others to engage in collective/societal activities that can be of economic (monetary) and power (governance) value, providing policy-makers with a non-economic solution to social problems (Portes, 1998). Within development theory, it has become accepted that communities with a diverse range of social networks and groups can improve the efficiency of socio-economic and governance functioning generating connections between the state and environmental NGOs (Agder, 2003; Roseta-Palma *et al*, 2009). For conservation management, these functions are important to facilitate support for conservation policies because local community representatives can actively participate in decision-making and enforcement (Rudd *et al*, 2003; Pretty and Smith, 2004; Jentoft *et al*, 2007; Lansing, 2009). However, weak social capital has been attributed to the limited success of stakeholder engagement in management processes (MaCay and Jentoft, 1998).

Through investigation of social capital at both a community and household level, geographical livelihood diversification and use of marine resources can show where discrepancies arise between everyday resource use and spatially driven conservation measures, and also between community social capital and the household-level reality of social capital (Crona and Bodin, 2006; Bodin and Crona, 2008; Lansing, 2009). In this way, conservation managers would be better able to address how household-level drivers of resource use (direct and indirect) can undermine conservation measures that

have apparent community-level support. Within the context of the CCMPA, it is important to make distinctions between different user groups of marine resources, and the representativeness of community leaders for these in consultation with the Honduran Coral Reef Fund (HCRF).

### 3.2.2 Modes of fisheries governance

Fisheries governance divides into three main modes of institutional arrangement: 1) centralised hierarchical governance characterised by top-down, command-and-control mechanisms; 2) market-based governance based on the forces of supply and demand; or 3) participatory governance allowing stakeholders to be involved in the decision-making process (Van Vliet and Dubbink, 1999; Gray 2005). One type of the participatory mode is co-management, which is an institutional hybrid arrangement emphasising stakeholder participation and shared responsibility for fisheries management between the government and user groups, with the aim of reducing costs, improving decision-making, and sharing of property rights more equally (Imperial and Yandle, 2005). However, such arrangements can be difficult for small-scale fishers and non-commercial interests to participate without financial resources (Yandle, 2003).

In coral reef regions, fisheries have often allowed a market-based mode of fisheries governance, following the imperatives of economic development, to undermine traditional social organisation and management systems, which contained both top-down and bottom-up elements. This has resulted in a compromise of fish species and coral sustainability as species are increasingly targeted for commercial revenue (Yandle, 2003). Because coral reef-based fisheries remain an integral part of traditional lifestyles for coastal populations, marketisation has sometimes had a severe impact on the well-being of indigent populations. To stem the ecological damage of marketisation, in many communities, MPAs have been established, often by top-down measures. But the socio-economic effects of both the problem (marketisation) and the solution (MPAs) have not been systematically researched (Cinner and McClanachan, 2006). This project seeks to fill this gap, and in doing so, demonstrates how co-management and adaptive management structures offer the best way to reconcile conservation and social objectives.

### 3.3 Structural Context (updated from 2007)

In the Caribbean region, some government agencies have begun to transform their structures and operations to become increasingly favourable to participation, expressed through changes to institutional arrangements, national legislation and sectoral programmes. Simultaneously, community-based and non-governmental organisations (NGOs) have begun to assume a greater responsibility in natural resource planning and management. This change has been a result of several factors, primarily an increasing voice of NGOs in Caribbean society, inadequate financial and human resources from central government, and persistent resource degradation. Significant international agreements and donor agency projects have also emphasised the need for participatory approaches to resource management (Renard *et al.*, 2001). Such changes can be seen in the MBRS region where significant international collaboration (GEF/World Bank Mesoamerican Barrier Reef Project; WWF Mesoamerican Reef Ecoregion Project; ICRAN Mesoamerican Reef Alliance) has enabled adaptive management and conservation initiatives to be implemented for the sustainable use of marine resources (McField *et al.*, 2008).

Within Honduras, the management of coastal and marine protected areas applying the MBRS approach uses a framework provided by the Department of Protected Areas and Wildlife (DAVPS). This is a subsidiary department of the Forestry Development Agency (COHDEFOR) created in 1991. It assumes the regulatory responsibilities to regulate and manage resources relating to wildlife. The vision of the department is to 'guide by a strategic plan in a decentralised, participatory manner, establishing alliances with key players involved with principals of quality, research, development and innovation' (COHDEFOR, 2000). Management approaches now focus on developing private sector partnerships aimed at promoting better management practices to reduce the negative environmental impact of tourism, fishing, agriculture and aquaculture industries (McField *et al.*, 2008). Two such alliances with NGOs on the north coast of Honduras that manage marine and coastal resources are the HCRF (Cayos Cochinos) and FUCSA (Cuero y Salado Wildlife Refuge), both of which are funded by international donor agencies.

Natural resource management in the Caribbean takes place within a context that has been shaped by the region's history, culture, geography, and economic forces. This context determines the ability and willingness of individuals, groups and organisations to participate in decision-making and management. An important feature of this region that differentiates it from most others is that Caribbean societies and systems of management reflect a relatively recent convergence of contrasting cultures and associated practices, including Amerindian, African, European and Asian. Therefore, their traditions and practices are not rooted throughout centuries of evolution, but are the result of adaptations to a great diversity of influences. This has created characteristics unique to the region including: dependency on monoculture and exports; radical transformation of the ecosystem due to agriculture and tourism; imported cultural values; externally controlled financial capital; and ownership and rights of access controlled by the few. These influences are often exemplified in natural resource management, where formal government agencies replicate the structures of former colonial powers, while informal networks and traditional values continue to determine the patterns of resource use. Not surprisingly, in such a changing milieu, conflicts between groups emerge for management to deal with, often centring around issues of rights and access to resources (Renard *et al.*, 2001).

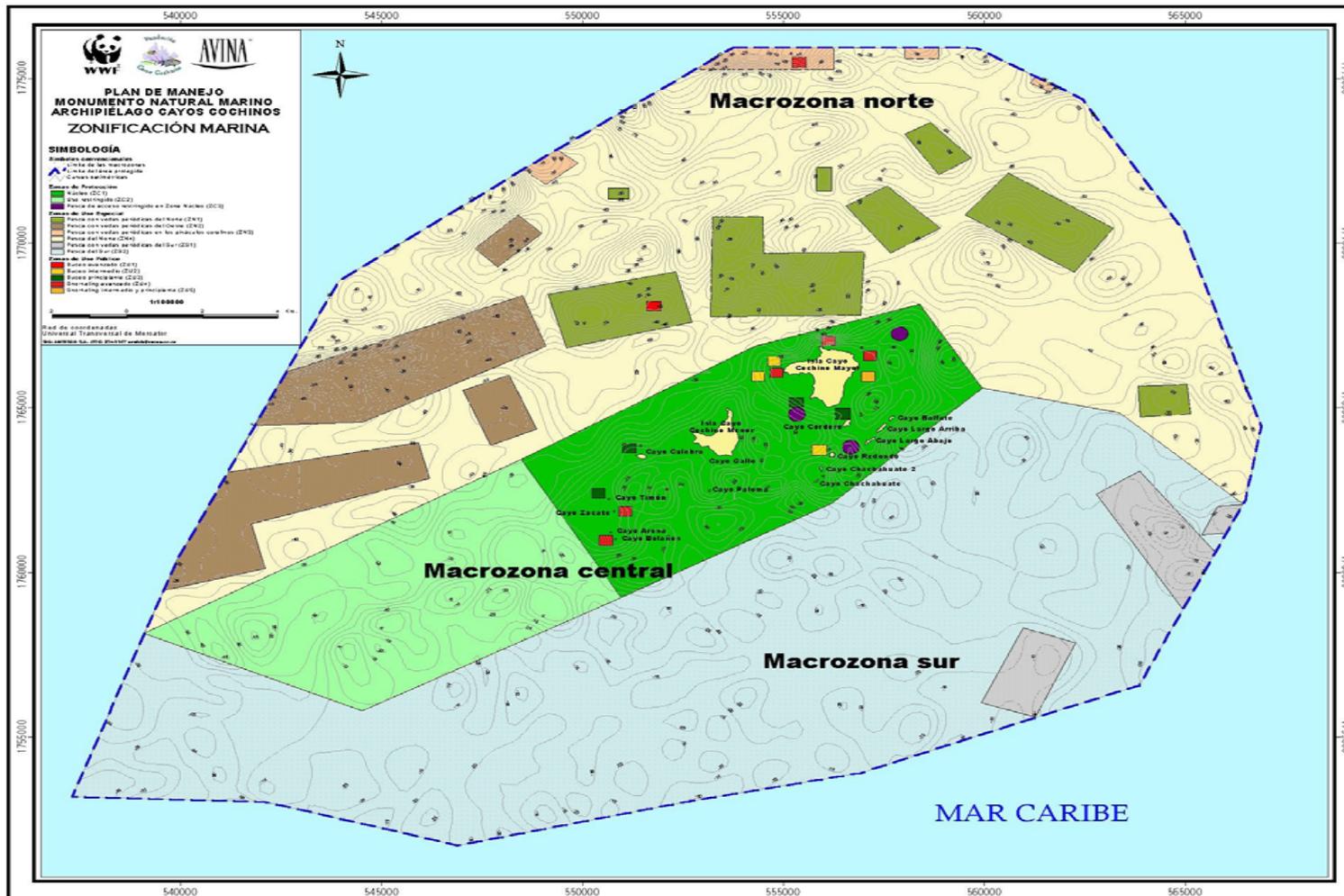
### 3.4 Local Context (updated from 2007)

The Cayos Cochinos are located 15 km off the Caribbean coast of Honduras, forming extensive coral reefs of the ~~southern-most~~southernmost part of the MBRS (Figure 2) (Harborne *et al.*, 2001). The Cayos Cochinos consist of two main islands and thirteen smaller cays. The islands were declared as a Marine Natural Monument in 1993 and became managed by the Honduran Coral Reef Foundation (HCRF) for the conservation of its 489 km<sup>2</sup> marine resources. In 2003, the legislative decree 114-2003 re-designated the Cayos Cochinos as the only statutory Marine Protected Area (CCMPA) in Honduras, and gave responsibility for the area to the managing agency for the subsequent ten years (2004-2014). In 2004, a five-year management plan was developed by the HCRF and WWF. This management plan prohibited all commercial fishing activities within the MPA, but also established restrictions on artisanal fishing and development activities as part of the conservation effort. Garifuna communities both on the cays and mainland are traditional artisanal fishers and resource users of the MPA. The Garifuna are descendents of Africans and Amerindians who, following exile by the British from St. Vincent in 1797, settled along the Caribbean coastline of Central America (Brondo and Woods, 2007; Palacio, 2000). Honduras has the largest Garifuna population, with over forty settlements stretching

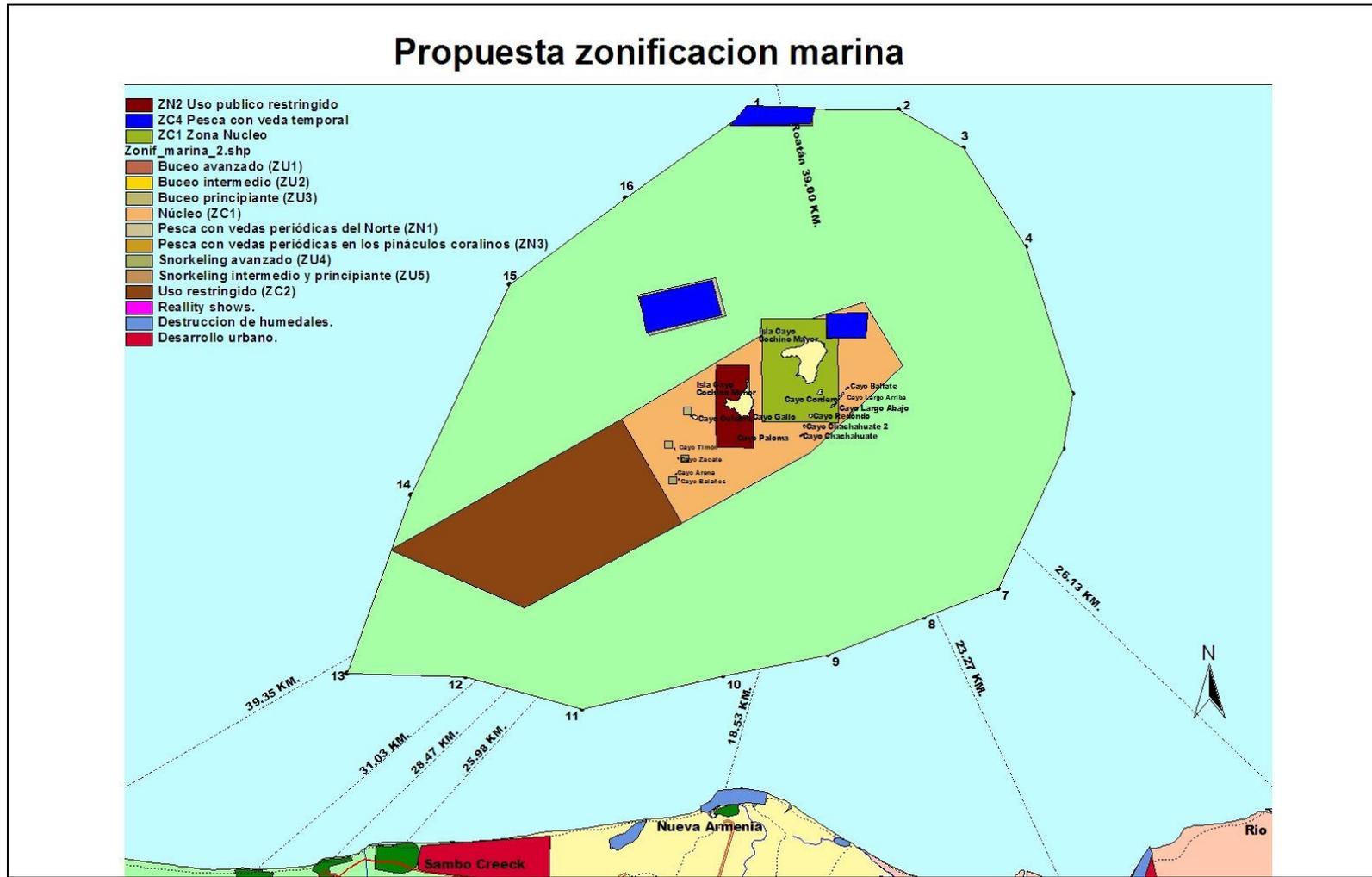
along the northern coastline and islands. The Garifuna inherited the livelihood strategies of their African and Amerindian ancestors, practising subsistence fishing and farming, with some employment diversity as transnational wage labourers on fishing trawlers and fruit plantations (Brondo and Woods, 2007). The mainland Garifuna communities (Neuva Armenia, Rio Esteban, Sambo Creek, ~~Cerozal~~ Corozal) have temporary dwellings on some of the cays in the CCMPA which were traditionally used to overnight during fishing excursions. Two of these temporary dwellings now have permanent resident populations (Chachahuate, East End) making them particularly affected by the management plan regulations because they rely on fishing for subsistence and for trade.

In 2007, the HCRF, supported TNC and WWF, held a series of stakeholder meetings to discuss revisions of the 2004-2009 management plan. The meetings were held in Jutiapa, a town located midway between the Garifuna communities and La Ceiba. The revision process was designed to identify and prioritise threats to the conservation objectives of the CCMPA, using information gathered from meetings, biological and socio-economic data to produce an adaptive management strategy (Vindevoxhel, *pers.comm.*). The discussions were dominated by the negative socio-economic effects of the filming of a reality show 'Survivor/L'Isola de Famosa' within the MPA boundaries for two months during 2007 (with subsequent series filmed in '08 and '09), The production of the show reportedly caused some damage to reef crests within the MPA, but more importantly to the fishers, prevented them from accessing fishing grounds for the collection of bait fish (fry) during the live transmission. The communities were also economically disadvantaged during these two months because only HCRF owned boats were used to transport both people and equipment between the Cayos Cochinos and the mainland. Therefore, as a result emphasis was placed on combining biodiversity monitoring with the socio-economic needs of the Garifuna communities to produce a more socially acceptable management plan for the second phase of management (due 2009-2014). The collective action of the fishers allowed the Garifuna communities to challenge the artisanal fishing regulations, which resulted in several favourable changes adopted in the second management plan, legalised in 2008. The main changes include the opening of all fishing banks within the CCMPA without restrictions (previously rotational seasonal closures), a smaller No-Take Zone (NTZ) around Cayo Menor to protect yellowtail snapper and grouper spawning aggregations sites as identified by TNC, an extension of the southern boundary to the mainland to prevent commercial vessels from passing through community fishing grounds, and inclusion of the reality show to identify specific sites and times for tourism and fishing activities. The physical changes are shown on Maps 1 and 2, documenting the original fishing restrictions (Map 1) and the revised fishing restrictions in the 2008-2013 management plan (Map 2).

Map 1: Zonification of CCMPA 2004-2009 (Source HCRF)



Map 2: Zonification of CCMPA 2008-2013 (Source HCRF)



## **4. FIELDWORK DESIGN**

### **4.1 Fieldwork Schedule**

The fieldwork in this thesis was designed to assess the effectiveness of the management of the CCMPA in meeting its ecological, social and governance objectives for fisheries management. The project also evaluates the tourism opportunities in each community. As a continuation of the research work in 2007, the same Garifuna communities were sampled: two coastal communities (Rio Esteban and Nueva Armenia) and two island communities inside the MPA (Chachahuate and East End) (Figure 2). Heads of households, community leaders and fishers were chosen from each community. Key informants interviews were conducted with individuals deemed to hold specific environmental, legislative and tourism ~~knowledge from~~ knowledge from each community as well as government and non-governmental organisations located in La Ceiba.

The fieldwork was scheduled for eight weeks during the months of June-August 2009 (Table 1). Pilot household surveys and individual fishers interviews were conducted in Corozal and Sambo Creek prior to the start of the field season as these two communities are representative of Garifuna communities. During the field season, one week was spent living in each community, except for East End where the researchers stayed for two nights in the newly built cabanas. During these weeks, the research team resided in community houses, in groups of 2 or 3, living, eating and participating in daily community life. This meant that the researchers were seen to be involved with the community, albeit for only short periods of time, and given an appreciation of everyday Garifuna life. These home-stays were organised between the members of the tourism group in each community and Tony Ives (GAD). The researchers were accommodated in the better quality houses, i.e., with the more wealthy community members, which will have affected the perceptions of other community members. Where possible the translators used by the researchers were students from the local University, C.U.R.L.A, and were therefore accepted into the communities more readily, thereby also helping the researchers to be more welcomed. As a direct consequence of the political unrest experienced across Honduras during the field season period, it was not possible to use the same translators consistently, both travelling and living with the researchers. Therefore, Peace Corps volunteers working and living in the Garifuna communities and in La Ceiba were also used as translators when C.U.R.L.A volunteers were not available. Table 1 sets out the fieldwork schedule, indicating the different methods employed to obtain data.

Table 1: Fieldwork schedule and summary of methods

Location	Duration	Method	Number	June				July				August				
				1	2	3	4	1	2	3	4	1	2	3	4	
Sambo Creek and Corozal	2 days	Pilot household survey	4													
		Pilot fishers survey	4													
Rio Esteban	2 weeks	Household surveys	34													
		Key informants	4													
		Individual fishers	4													
		Community map	1													
		Tourism interviews	10													
		WCP interviews Part. Observation	6													
Nueva Armenia	1 week	Household surveys	37													
		Key informants	4													
		Individual fishers	8													
		Community map	1													
		Tourism interviews	10													
		WCP interviews Part. Observation	12													
Chachahuate	5 days	Household surveys	11													
		Key informants	3													
		Individual fishers	8													
		Community map	1													
		Tourism interviews	5													
		WCP interviews Part. Observation	4													
East End	2 days	Key informants	4													
		Community map	1													
		Tourism interviews	2													
		WCP interviews	2													
		Part. Observation														
La Ceiba	1 week	Key informants	14													
		Tourism informants	10													
		Tourism interviews	9													
		WCP interviews														
Utila	1 week	Tourism interviews	12													
		Key informants	6													
Cayo Menor	2 weeks	Data analysis														

## 4.2 Study Sites

### 4.2.1 Chachahuate

Chachahuate is the sister community of Nueva Armenia, occupying the largest of the cays in CCMPA (15° 56' 40N, 86° 28' 43 W). There are approximately 43 households with a maximum population of 200 during the peak fishing season, and an average resident population of 90 people. The island has reduced in size following Hurricane Mitch in 1998, to about 50 metres in length because it is exposed to the prevailing north-easterly trade winds. There is some tourism development with US AID and WWF sponsorship of a restaurant and cabanas, and the island is advertised in the national tourism guide 'Honduras Tips'. The reef flat is approximately 1metre deep, sloping gently to a 20 metre wall and sandy bottom. The reefs surrounding the cay also show signs of point source pollution from island latrine run-off where there is a higher concentration of sponge and soft coral cover.



Photograph 1: Chachahuate main beach, south side of the island.

### 4.2.2 East End

East End is the sister community of Rio Esteban, situated on the north side of Cayo Menor (16° 30' 0N, 15° 52' 0W) within the CCMPA. The community has an approximate population of 22 residents living in 19 houses along a single 200metre stretch of beach, peaking to a maximum population of 90 during the fishing season (April-September). The community has one primary school which serves all of the cay communities inside the MPA. The area also has a Honduran Navy station where the four Navy personnel employed to patrol the MPA reside. East End has some tourism development, receiving US AID funding in 2007 to build cabanas and a restaurant that are now operational. The immediate marine environment consists of inner reef flats of approximately 3 metres in depth, gently sloping to a wall of about 22 metres.



Photograph 2: East End main beach, site of new cabanas for 2008.

### 4.2.3 Rio Esteban

Rio Esteban is a small Garifuna settlement furthest from the main city of La Ceiba on the north coast (15° 49' 60N, 86° 17' 60W), approximately 12 nautical miles from the CCMPA. The community has an estimated 630 inhabitants divided into several neighbourhoods (barrios), with one school up to secondary level and a community sponsored medical centre. The coastal region is an area of estuarine discharge from the River Aguan, mangrove forests and mud flats creating an environment of relatively high deposition with a natural spit. The community has relatively little tourism with one hotel (currently closed) and disused cabanas on the beachfront. It is the least accessible of all the study sites, requiring an off-road vehicle to navigate through a river bed during the dry season. During the wet season this river bed is prone to flooding and prevents any access to or from the community. The community does have a regular daily bus service to Jutiapa and Trujillo; however, these buses cannot pass through the river when in flood. In 2008, the Municipality of Colon was due to begin construction of a bridge over the River [Esteban, Esteban](#); however this is yet to be built.



Photograph 3: Main street in Rio Esteban.

#### 4.2.4 Nueva Armenia

Nueva Armenia is a relatively large Garifuna settlement on the north coast mainland, approximately 40 km from La Ceiba (15° 49' 60N, 86° 30' 60W). The community has an estimated 3000 inhabitants dispersed into distinct neighbourhoods, with two schools up to secondary level, a medical centre, several churches and a fish freezing plant, although this has been un-operational since 2005. There is a relatively high level of tourism with two hotels and three restaurants, and organised boat trips out to the Cayos Cochinos. It is accessible with regular daily bus services to Jutiapa and La Ceiba, and a purpose laid gravel road. The community is now split by the River Aguan which changed its course because of the severe flooding caused by Hurricane Mitch in 1998. As a result of the hurricane, new municipal housing has been built to re-house displaced members of the community. The immediate coastal zone has a tidal sand bar, mud flats and fluvial run-off. The coastal area is used as the entering point by some tourists to the CCMPA.



Photograph 4: Nueva Armenia Barrio Arroz

#### 4.2.5 La Ceiba

La Ceiba is the third largest city in Honduras, but is regarded as the cultural capital because of its proximity to the Bay Islands. As a result, La Ceiba is the entry point for tourists travelling to the Bay Islands by ferry or air transport. The city is also the location of the HCRF, which has quick access to the CCMPA via the port, and the location of government agencies departmental offices that have institutional and legal responsibility for the marine environment. One such important government department, DIGEPESCA, has the duties of monitoring all fishing activity within the Department de Atlantida region; issuing commercial and artisanal fishing licences; and recording the supply of goods and their prices. The city is well served by regular buses and taxis, enabling frequent access for local communities to education and services. La Ceiba was badly affected by Hurricane Mitch in 1998, and has frequent flooding problems during the wet season.



Photograph 6: La Ceiba, Caribbean coast (Netropica images)

#### 4.2.6 Utila

Utila is the smallest of the Bay Islands (11km by 4km) and the closest to the mainland (27km). The island was under the sovereignty of Great Britain until the mid 1800s, rooting the island inhabitants in Caymanian culture and dialect, with a strong Garifuna presence. The island has now become heavily developed as a centre for adventure and dive tourism in Central America, with an average 2800 visitors per year (Alton Cooper, pers comm.). The main inhabitants are now foreign immigrants from the USA and Canada, with a large proportion of temporary residents during the summer tourism season. The Bay Islands have also recently become a Tax Free Zone (2006) designed to promote touristic developments within an environmentally sustainable framework for the future. The fringing reefs around Utila remain damaged from a mass bleaching event and subsequent hurricane in 1998, and the island also suffers from unregulated artisanal and commercial fishing. In contrast to CCMPA, although Utila has a marine reserve, it is not statutory, and has no management plan. Moreover, the traditional artisanal fishers are Cayman British, not Garifuna. Corozal is the closest community to La Ceiba, and has the fewest number of fishers and least dependency on the marine resources. However, migration of fishers to cays of Utila has occurred since the introduction of the management plan in 2004, creating new frictions between fisher groups in these Cays.

### 4.3 Research Methods

The research methods were chosen to assess the effectiveness of the stated objectives for the management of the CCMPA under specific socio-economic and governance criteria adapted from the assessments used by Bunce et al. (2000), Pomeroy et al. (2004), Cinner *et al* (2006, 2009), Bodin and Crona (2006) and Bene (2009) (Table 3). In order to generate information that would provide a broad, holistic representation of the issues affecting the governance and management of the CCMPA, a multi-disciplinary range of methods were used, designed especially to understand stakeholder behaviour and perspectives. A combination of methods was used to assess the effectiveness of management under each objective in order to derive a more comprehensive understanding of stakeholder knowledge and perceptions. These methods engaged with different groups of stakeholders including community groups, government departments and non-governmental organisations. The data collected using these methods will be used to complement information gathered by other researchers focusing on specific ecological and fishing aspects of the CCMPA. The extent to which each research method could be used to assess the effectiveness of the management of the CCMPA was determined during the pilot research season in 2006, and a full survey season in 2007. The methods used during these two phases were further developed during 2009 to ensure adaptability both to existing data, and to respond to changes as the information needs have developed.

As well as specific indicator assessment, material style of life and employment multiplicity information was gathered to form the basis of a standardised socio-economic monitoring program assessing the effects of the MPA management plan on the Garifuna communities. This information will inform the managing agency of adverse or advantageous effects that may have been generated by endogenous changes in management of the MPA, or as a consequence of exogenous factors. Table 2 sets out the different research methods associated with different assessment criteria.

Table 2: Project objectives, associated methods and relevant management plan objectives

<b>Project Objective</b>	<b>Research Methods</b>	<b>Management plan Objective (translated by author)</b>
<b>1. To monitor the socio-economic changes of dependency on natural resources in the local Garifuna communities using a formal/informal livelihoods analysis</b>	Household survey Key informant interviews Individual fishers interviews	1. To allow the normal development of the customs and lifestyles of the ethnic groups living inside the protected area, respecting their traditions and ecological knowledge, and all assets contributing to the achievement of new development initiatives for these groups.
<b>2. To assess the social capital and cohesion of the local communities for participation within the decision-making process for the management plan</b>	Household survey Key informant interviews Individual fishers interviews Non-participant observation	2. To develop mechanisms to promote the incorporation of populations located within the protected area and its zone of influence, and the relevant actors that contribute to the higher dynamics of sustainable development.
<b>3. To investigate the suitability of existing governance and legal frameworks for successful implementation of the management plan through a period of transition to the second management phase</b>	Key informant interviews Individual fishers interviews	3. The co-management shared between the institutions of the State (DIGEPESCA), administrators of the protected area and the artisanal fishermen (local fishermen and regional council of fishermen)
<b>4. To evaluate the community benefits of the CCMPA through alternative employment opportunities, existing levels of tourism and associated infrastructure to explore</b>	Household survey Key informant interviews Individual fishers interviews Non-participant observation	4. To provide opportunities for recreation and low-impact ecotourism according to its potential, as a model that harmonises with the natural and cultural features of the protected area.

<b>future business opportunities</b>		
<b>5. To assess the potential use of the Wildlife Conservation Product (WCP) scheme to encourage community wide alternatives employment opportunities</b>	Household survey Key informant interviews Individual fishers interviews Non-participant observation	5. To improve the current conditions for tourism by structuring the operation and control of quality through the development of a tourism chamber.

#### 4.3.1 Detailed account of research methods

Socio-economic, livelihoods, governance and social capital indicators were used to examine the human populations using the marine resources, their dependency on fishing, household occupational structures, perceptions of tourism developments and associated costs and benefits, and the level of social cohesiveness for both natural resource management and further tourism opportunities. Research was conducted over one week at each site using four volunteer researchers and three translators. In each community a household survey was used to extract information to create a community level analysis. This information was then triangulated with key informant interviews and individual ~~fishers~~fisher's interviews at each site to determine dependency on natural resources and tourism.

##### 4.3.1.1 Household Survey

Household surveys were conducted in Chachahuate, Rio Esteban and Nueva Armenia as the principal communities affected by the CCMPA. East End was not sampled in this study due to timing of the researchers' visit when very few residents present in the community. There were between 20 and 50 household surveys conducted at each site in order to assess community characteristics, resource knowledge and dependency on the CCMPA, and perceptions of tourism development (N=84). Household sampling was based on a systematic sampling design, where a sampling fraction of every 5<sup>th</sup> house in each neighbourhood was surveyed (Cinner *et al*, 2008, 2010). A community map (see 4.3.2.2) incorporated all neighbourhoods, private housing, community buildings, roads and paths was created by the research team which was then subsequently used for the sampling design of the household surveys. Different households were sampled than those in 2007 because of respondent fatigue and absence of occupants. However, as has been demonstrated in the previous field seasons, households are representative of each community. The time and resources available (number of researchers, translators and days available to conduct the research) determined the number of household surveys in each community. Externalities including fiestas, extreme weather and illness also affected the numbers of household surveys conducted. The head of each household was surveyed where possible, or another adult from the household (usually female). Interviews generally took 45-60 minutes per household.



Photograph 7: Student and translator conducting a household survey in Chachahuate.

The survey was separated into five themes, covering basic demographics and household economics, natural resources, social capital, collective action and tourism (Appendix A). The themes contained both quantitative and qualitative questions using closed and open-ended formats, and included some likert scale 'rapid answer' sections. This strategy was adopted to incorporate sections relevant for all the researchers involved in the study. The survey design included a repetition of demographic and economic questions from 2007 to maintain a socio-economic baseline study to enable an analysis of change. Social capital and collective action questions were introduced into the survey design in order to understand community cohesion for effective participation in natural resource management and tourism

development. The information was translated directly as given, and some responses were further probed by the translators to provide more information, or a more detailed answer. All household survey information was recorded as individual questionnaires and entered into a database that was updated daily.

#### 4.3.1.2 Key Informant Interviews

Structured interviews with key informants both in the Garifuna communities and with other government and non-governmental organisations were used to examine community governance, tourism and fishing issues in more detail. This allowed for a better understanding of the mechanisms for community decision-making, dependency on tourism and user characteristics and dependency on marine resources. The information extrapolated included reciprocity and trust, social cohesion, participation in decision-making, participation in tourism activities, interactions with other communities and organisations for tourism and natural resource management, seasonality of fishing and tourism activities, markets for activities, knowledge of management regulations and institutional arrangements facilitating the objectives of the CCMPA. Key informants were selected using both snowball sampling (where a respondent was suggested by a community member) and specific selection because of their position in the community or involvement with fishing activities/ management. Key informant availability and willingness to participate determined the depth and quality of each interview. Interviews typically were 2-3 hours long, conducted either in the interviewee's home or office. Different interview scripts were used between the different groups of informants, but covering similar themes to enable some direct comparison where appropriate.

The questions were semi-structured and open-ended to allow for a coherent structure to the interview, and to develop avenues at a greater depth of information where possible. The information collected was all qualitative. The recorded interviews were transcribed as soon as possible after the event using Express Scribe. When interview recording was not possible, two or three researchers were used to record the interview which was then typed.

#### 4.3.1.3 Individual fishersfisher's interviews

Individual fishers interviews were conducted in Rio Esteban, Nueva Armenia and Chachahuate. The interviews intended to be held in East End were not possible because all fishers at the time of our visit were on foraging trips to the Bay Islands. The fishers interviewed included the leaders of fishing groups in each community, and followed a snowball sampling technique of recommended fishers within this group. However, an equal number of individual fishers were interviewed where possible in each community using a random sampling method of selection. Fishers were identified on the beach, and interviewed at their chosen time.



Photograph 8: Author conducting an interview with Head of Fishers group on Chachahuate.

The Interviews used a semi-structured format, with some open-ended questions for group discussion. The interviews lasted for 1-2 hours, and were conducted in the fisher's residence or on the beach. The survey was split into five sections covering basic demographic information, historical fishery information (including CPUE data), current fishery information (including CPUE data), social capital and future scenarios. Individual fishersfisher's interviews were used in 2009 as opposed to focus groups because it was discovered in 2007 that sensitive and political information was easier to obtain when an interview was completed on a one-to-one basis between the fisher and researcher. This strategy enabled individual behaviours and perceptions to be generated, and provided more detailed information about individual fishing patterns and motivations.

### 4.3.2 Supplementary methods

#### 4.3.2.1 Non-participant Observation

Non-participant observation was possible because of home-stay accommodation in Rio Esteban, Nueva Armenia and Chachahuat. The cabanas previously used in Rio Esteban had since fallen into disrepair, forcing the community to generate a tourism board that organised and arranged the home-stays. The tourism board of Chachahuat has developed further to accommodate visitors, forming a cooperative of families that shared cooking responsibilities for the island restaurant. This system now includes sixteen households, each one cooking for twenty visitors before rotating to the next household in the group.



Photograph 9: Example of homestay accommodation in Rio Esteban

The same houses were used for the home-stays as in the previous year, again through the liaison of Tony Ives with each community group. This enabled greater familiarity for the researchers and individual houses, and created a more understanding environment. However, it was an experience limited to specific, and often the wealthiest, families.

#### 4.3.2.2 Community maps

The community maps were created for household survey sampling. Google maps were selected and downloaded for each community to provide an overview of the size and distribution of households. To familiarise researchers with each community, hand-drawn maps were created as part of a walking transect. These maps were then used to mark on participating households in sequential order, and later transferred to the Google map when connection to the internet was possible. The maps were also labelled with all tourism facilities and important community structures (bridges, churches, health centres, community and community centres).

## 4.4 Fieldwork Limitations

There were some limitations which affected the quantity and depth of information collected during the 2009 season. First, although the translators worked effectively and efficiently with the research group, their time was split between all the researchers, meaning only three researchers could be collected data at any one time making progress slow. However, the remaining researchers used the time for data entry and preparation of other work. Also, the translators worked incredibly hard and at times suffered from fatigue. Second, the political disturbances that affected the field season from June onwards also prevented consistency of using the same translators. This was a result of strikes held periodically at the university which affected the timetabling of examinations. As a consequence, 8 different translators were used throughout the season which affects reliability of the data. Moreover, key informant interviews were sometimes difficult to schedule with the translators in La Ceiba because of the translators' priority university commitments. Third, the political situation created difficulties for interviewing key informants in La Ceiba as demonstrations often caused road closures, and the imposed curfew made interview scheduling troublesome. This was also compounded by the need for student researchers to interview key informants making more than one visit necessary in order to complete the information needs of the whole group.

## **5. RESULTS**

It should be noted that the socio-economic data in this report is not exhaustive, and the discussion is based on relatively small samples of households and fishers. The data has not been statistically analysed, and the results presented here are comparative analyses of household surveys.

The results will focus primarily on the three study sites within the catchment area of the CCMPA: Chachahuate (4.2.1), Rio Esteban (4.2.3) and Nueva Armenia (4.2.4). East End (4.2.2) will be discussed where key informant interviews were conducted for community governance and tourism. La Ceiba (4.2.6) served only as the location of the majority of key informant interviews, and these shall be referred to by organisation. Utila (4.2.7) will be analysed and discussed as a comparison for the principal three sites, but not graphically represented.

The results are split into two main sections:

- 5.1. A summary of the main findings for the three principal study sites.
- 5.2. A thematic comparative analysis of the project objectives.

### **5.1 Results Section 1: Summary of 2009 Household survey results for Chachahuate, Nueva Armenia and Rio Esteban**

#### **5.1.1 Chachahuate**

The community of Chachahuate remains the most actively fishing community, with 50% of households interviewed (n=11) engaging in fishing as the main economic activity. However, tourism has increased in economic importance to equal fishing (50%). Remittances were not mentioned at all as a source of income, although given ~~it's~~ importance in 2007 (32%), this is most likely to be the result of fewer samples. Fishing remains the most valuable income generating activity, accounting for 39.1% of weekly income with mean value of \$36.33. Chachahuate has a high degree of household employment multiplicity with 92% of households engaged in two or more income earning jobs. Fishing and tourism are still regarded as the only income generating opportunities for men in this community, and cooking, tourism related activities and buying/selling fish are the opportunities for women. However, there are some opportunities for seasonal employment for men as boat captains during the months when the reality show is produced in the CCMPA. The average monthly expenditure per household (\$304.20; 5627.62 lempira) is now the lowest of all the communities, although the value has risen since 2007. This rise reflects the additional costs associated with transporting food and fuel from the mainland to the islands. The awareness of the rules and regulations associated to managing the CCMPA is now higher than in 2007, with 65% of the community showing some degree of knowledge of management. There was a perception of equal ability between the HCRF and the community to manage resources, with 67% of the respondents believing both sides manage resources well. The structure of meeting with the HCRF has changed since 2007, being more inclusive of the whole community, and 67% of the community are now happy with their community representation during these meetings. However, half of respondents believe that overall the CCMPA has had a negative impact on the functioning of society and the economic well-being of the community, citing fishing restrictions and oppression as the two main causes for decline.

#### **5.1.2 Rio Esteban**

Rio Esteban continues to be the community least reliant on marine resources from the CCMPA. Only 18% of households surveyed (n=34) engaged in fishing as an income generating activity. However, the main sources of income have changed from construction and salaried employment in 2007 to agriculture (35%), remittances (21%) and fishing (18%). When asked what job opportunities there are for men in the community, 100% of respondents listed agriculture, and 94% of respondents also listed fishing. Construction, an important source of income in 2007, was only stated by 21% of respondents in 2009. Therefore in 2009, traditional subsistence jobs have become the most important sources of income, as well as reliance on remittances from outside the community. The job opportunities given by respondents for women are entirely domestic, reflecting an important informal source of subsistence income to households in Rio Esteban. These included making and selling cassabe bread (92%), looking after agricultural land (29%) and being a housewife (21%). Interestingly, tourism related activities were not mentioned by any respondent as an opportunity for either men or women in Rio Esteban despite the tourism generated by Operation Wallacea during the summer months. There is a relatively low level of household employment multiplicity, with only 32% of households working in two or more activities. The vast majority of households now rely on one source of income (59%), and 9% of households rely

solely on remittances listing no income generating activities within the community. Surprisingly, the average monthly expenditure is now the highest of all the communities (\$349.03; 6457.03 lempira) having increased by more than 100%. Awareness of the management plan for the CCMPA remains very low, with 82% of respondents stating they have no knowledge of the area. However, 41% of respondents believed that the HCRF was managing the area well, whereas only 35% of respondents believed the area to be well managed by the community. The lack of awareness about the CCMPA is reflected in the presentation of the community, with 74% of respondents believing that only fishers would attend any meeting concerning the area. However, the vast majority of the community are happy with this group representing the community (76%). Overall, it is clear that the wider community does not possess much knowledge or interest in the CCMPA, unsure of the effects of the management on their economic or social well-being (82%). Those respondents that did provide some knowledge of the CCMPA believed the area to be having a negative economic and social (26%) impact on the community.

### 5.1.3 Nueva Armenia

The majority of households surveyed in Nueva Armenia (n=38) have remained reliant on remittances as their main source of income (39%). Interestingly, there has been an increase of fishing and fishing related activities making it the second most important source of income (24%, double the contribution to income in 2007). Ownership of pulperias (informal community store) is now the third most important source of income (21%), and importantly tourism only accounts for 10% of income to the households surveyed. This reduction can in part be attributed to the shift away from Nueva Armenia by Operation Wallacea. 100% of respondents stated fishing as the main income opportunity for men in the community, and only 3% of respondents listed tourism. Importantly, the main job opportunity for women in Nueva Armenia was buying and selling fish (58%), corresponding to the importance of the female informal sector within Garifuna communities as a contribution to subsistence income. However, this community has the greatest diversity of income generating activities (n=14), with 6 of those jobs in the formal sector. This is because of the community's close proximity to the main coastal city of La Ceiba, giving greater access to employment opportunities in the city. Similarly to Rio Esteban, household employment multiplicity is low, with only 26% of households engaging in more than one income generating activity. 59% of households are reliant on only one income generating activity, with 16% wholly reliant on remittances. The average monthly expenditure is relatively high (\$322.47; 5965.67 lempira) having increased significantly since 2007. Awareness of the management plan for the CCMPA is lower than in 2007, having dropped to only 49% having some knowledge of the CCMPA. 45% of respondents believed that fishers would attend meeting concerning the CCMPA, and only 21% of respondents thought the whole community would attend. However, 61% of the community are happy with this representation for natural resource management.

## 5.2 Results Section 2: Thematic comparative analysis of the project objectives

### 5.2.1 PROJECT OBJECTIVE 1: To monitor the socio-economic changes of dependency on natural resources in the local Garifuna communities using a formal/informal livelihoods analysis.

In order to monitor the changes in the socio-economic dependency in the communities first it is necessary to chart the current livelihood options and their importance for income.

#### 5.2.1.1 Indicator: Household income distribution by source for socio-economic structure

Principal sources of household income are important to understand stakeholder characteristics which explain how people use the resources available to them to make a living for themselves. This will enable an understanding of the impacts of management on local communities, and who is benefiting or being disadvantaged by regulations. Changes in sources of income may indicate positive or negative outcomes from the MPA and alternative livelihoods, or may show exogenous changes influencing the community. This is also a measure of community dependency on resources which could influence management decisions and training programmes. The managing agency needs to ensure that communities have adequate means for livelihoods and incomes (Pomeroy *et al*, 2004). This indicator is used to discern the income generating activities per household that make up the livelihood structure of the community. Income generating activities include both formal (salaried) and informal (non-salaried/self-employed) sector jobs.

#### Chachahuate

Chachahuate relies very heavily on natural resources for both food consumption and sales (fish and shellfish) and for construction of traditional 'manaka' (thatch) roofs on their homes. Marine resources are considered more important to Chachahuatan respondents because of its economic value, food security and easy access for this island community, whereas terrestrial resources are limited. There is no communal agricultural land for crop production, and wood resources for housing are harvested from Cayo Mayor.

Since 2007, the dependency on natural resources for income in Chachahuate has shifted away from the dominance of resource extraction (fishing) towards resource conservation (tourism). Now both fishing and tourism represent 50% each of income generating activities, with most households engaging in both. All households on Chachahuate rely completely on fishing and tourism as their main sources of income. There is a gender division for these activities: men are engaged in fishing and transportation, women are involved in cooking for tourists. Owning a pulperia is also an informal income option that is important on Chachahuate, as these shops are the main source of household staples and cold drinks on the island. A number of respondents listed their occupation as housewife, which although has socio-cultural importance for reciprocal non-economic forms of payment (such as cleaning someone's house in return for transporting goods to and from market), does not provide any income to the household. Therefore housewife is listed as an occupation of the household, but not included within the number of earners. Two formal occupations were given as incomes for households on Chachahuate (teaching and electrician), however both jobs were performed elsewhere; teaching in East End and electrician in Nueva Armenia (Figure 1).

Chachahuate has the lowest diversity of occupations for income ( $n = 6$ ), reflecting the limited options on an island with no terrestrial resources or municipal services. There was also no stated reliance on remittances. However, it should be noted that Chachahuate and Nueva Armenia (sister mainland community) share strong familial links down the paternal line, and often household incomes are combined between the two sites. For example, agricultural earnings in Nueva Armenia may contribute to the household on Chachahuate but not be recognised as remittances because they are earned by the same person. Despite the limited occupational options, the vast majority of households in Chachahuate (92%) are involved in two or more income generating activities, giving the highest occupational multiplicity of all the communities. 75% of respondents also had two or more wage earners in the same household. This reflects the lower income generated from all activities making it necessary to diversify household livelihood patterns. As expected, 83% of respondents stated fishing as an occupation available to men, while being a housewife (50%) and cooking for tourists (42%) were occupations available to women. The average expenditure for the community has increased marginally since 2007 to 4645.72 lempiras (\$251.12). In this manner, Chachahuate has gone from having the highest to the lowest expenditures.

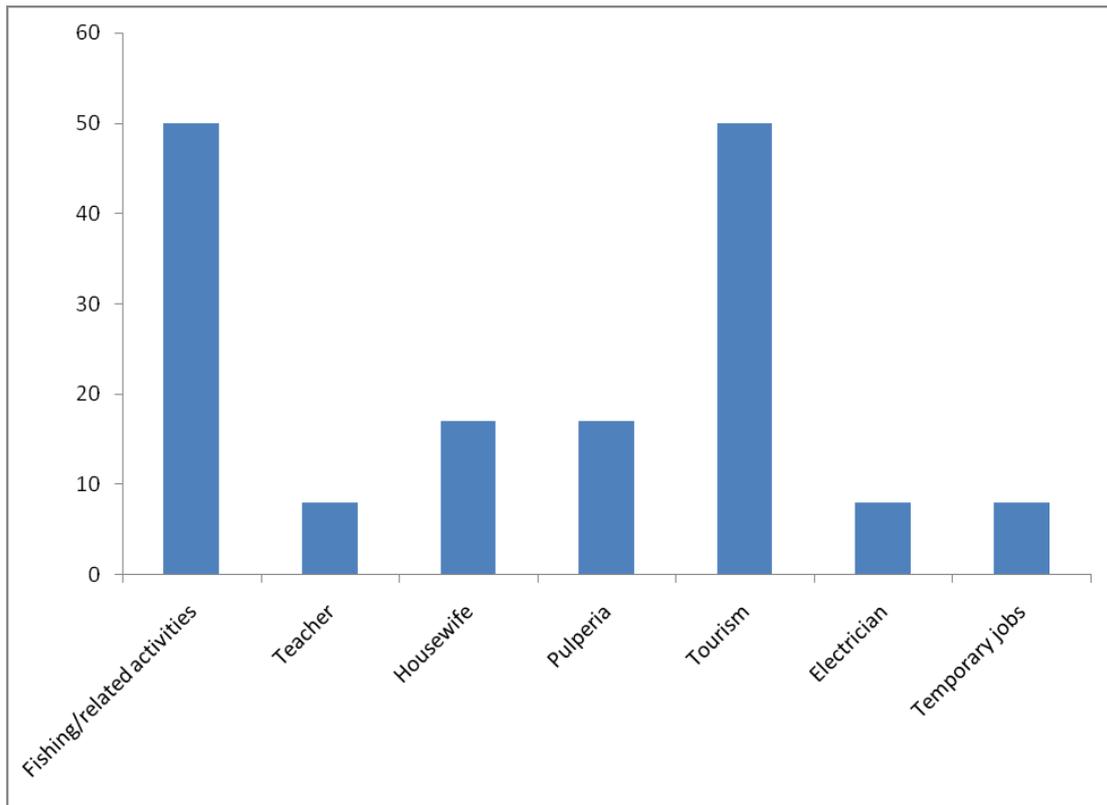


Figure 1: Percentage of occupations for respondent households in Chachahuate (n=12)

Tourism on Chachahuate has increased as a result of significant internal and external investment in facilities since 2006. The combined Fishers Group of Nueva Armenia and Chachahuate own and manage a basic one storey hotel on the island, which was also part-funded by WWF and GAD. The hotel serves as an alternative source of income for those fishers affected by fishing restrictions within the CCMPA. A WWF sponsored restaurant has also been built on Chachahuate which is run by the Womens' Group on the island, incorporating sixteen groups. Tourism on Chachahuate caters for two types of visitor: overnight stays in the hotel (24 hours) and lunch (2-3 hours) in the restaurant for visitors from the mainland and the Bay Islands. These types of 24 hour tourists are promoted within the tourism regulations stated in the current management plan.

East End (located within the CCMPA) has also had significant investment in tourism as an alternative source of income to fishing and fishing related activities. In 2008/09 two cabins funded by WWF and USAID have been erected on the beach front, along with a restaurant facility. These cabins differ to those on Chachahuate as they have been designed to accommodate up to ten people per cabin in bunk-bed style arrangements, staying for several nights. East End offers trekking, beaches and a snorkelling trail, and targets national visitors for weekend breaks as opposed to the one-day international cruise ship tourists that visit Chachahuate. However, the socio-economic ~~impacts of these developments~~ impacts of these developments are not included in this study because there is currently no income data as the projects have only recently been completed.

### Rio Esteban

Rio Esteban is heavily reliant on natural resources as a source of income and food, including marine products (fish and shellfish, 91%) and terrestrial products (wood materials, 26%, agricultural land, 42%) as the most important resources for the community. Wood materials are used for both housing and Cayucos, whilst fish produce is sold for profit and consumed within the community. 76% of the respondents considered marine resources to be the most important for Rio Esteban for income and food, whereas terrestrial resources (although also mainly important for income and food, 65%) were considered more important for traditional housing and transport (15%).

Since 2007, the importance of resource extraction through traditional activities for household income has increased in Rio Esteban, with 35% of household engaged in agriculture for income, and 26% of households surveyed listing agriculture as the most important activity for income. Similarly, 18% of households engage in fishing and fishing related activities within their livelihoods structure, with

12.5% of households ranking this as the most important activity for income. Therefore over half of the community rely on agriculture and fishing for income, making Rio Esteban heavily engaged with the informal sector. Interestingly, 100% of respondents stated farming and 82% stated fishing as occupations available to men in the community, therefore even those households that do not include fishing or agriculture as part of their livelihood strategies recognise the value of these activities for community-based occupations. Making cassabe bread was listed as the main occupation for women in Rio Esteban (88%) which was not given as an income generating activity by any household. Therefore, the female informal sector has a strong supplementary role within the community to provide additional subsistence income. Construction, which was a main component of household income in 2007, now accounts for only 6% of household income, reflecting the short-term nature of construction as an alternative source of income (Figure 2). Remittances from family members outside of the community (within Honduras or abroad) remain an important source of income in Rio Esteban. 21% of respondents rely on remittances as a contribution to the household income, and 19% of households rank remittances as the most important source of their income.

Respondents in Rio Esteban listed 11 different occupations for income including 6 jobs within the formal sector, reflecting the advantages of access to mainland urban centres for markets and training. As mentioned for Chachahuate, where housewife was given as an occupation within the household, this was noted for its socio-cultural value but not included in the socio-economic assessment. However, there has been a change in the livelihood multiplicity in Rio Esteban, with the majority of households (59%) now dependent on only one income generating activity, and 56% of respondents have only one wage earner in the household. Of those households with only one earner, the activities included fishing, tourism and remittances. Few households were entirely dependent on agriculture. Only 41% of households are engaged in two or more income generating activities giving Rio Esteban the lowest occupation multiplicity profile. Despite these statistics, Rio Esteban now has the highest expenditure of all the communities, with an average monthly expenditure of 6013.38 lempiras (\$325.05). This is almost double the average expenditure in 2007.

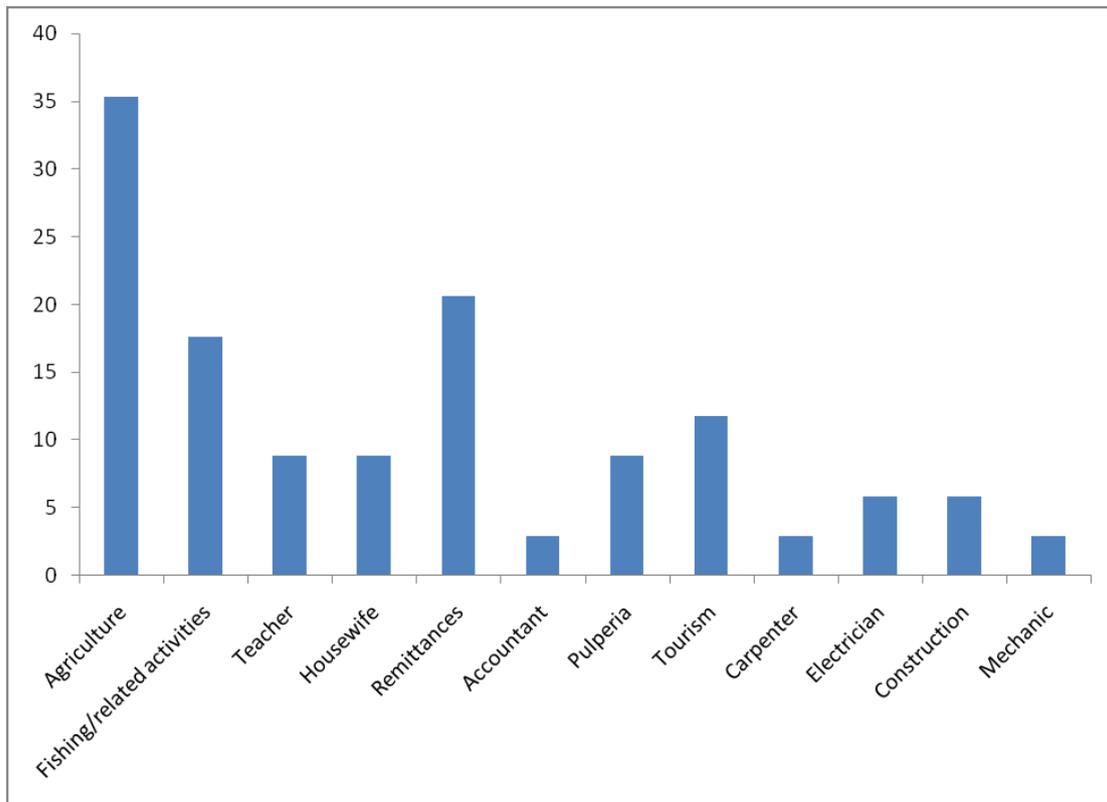


Figure 2: Percentage of occupations for respondent households in Rio Esteban (n=34)

Tourism is a growing activity in Rio Esteban, contributing around 12% of household income (equal to fishing) across the community, and for these households it is the primary source of income. This has increased since 2007 as a direct result of the number of seasonal visitors from Operation Wallacea passing through the community on overnight homestay visits before being transported to the research station on Cayo Menor. Tourism is predominantly an activity involving the women in the community

who manage and operate the homestays and restaurant. Men are involved in the transportation of tourists to the Cayos, and there are few individual artisanal craftsmen carving wooden sculptures and making traditional instruments.

### Nueva Armenia

Nueva Armenia has an almost equal dependency on marine (55% fish and shellfish) and terrestrial (47% wood products; 24% agricultural and livestock production) resources. These resources generate 34% of the community's income, and 29% of the food consumed. However, construction of housing, transport, heating and tools for artisanal occupations are also important uses of terrestrial resources.

The majority of income in Nueva Armenia comes from remittances earned by family members outside the community, accounting for 35% of community income and an average of \$30.42 per household per week. This is the highest level of remittances of all three communities, with the majority of the income being contributed by middle aged family members (fathers and mothers of school age children) living in the US. The importance of fishing as a component of household income has increased since 2007, now accounting for 18% of community income. Ownership of pulperias is also an important informal source of income in this community, contributing to 15% of the mean earnings. In contrast to Rio Esteban, Nueva Armenia generates very little income from agriculture (4%) suggesting that it contributes an important part to subsistence living rather than as an income generating activity, given that it was the main occupations stated by respondents for men in the community (13%). Fishing and fishing-related activities were stated as the primary occupation for both men and women in Nueva Armenia. 100% of respondents believed fishing to be the main occupation for men, and 58% stated that selling fish produce was the main occupation for women. Similarly to Rio Esteban, other occupations for women were informal jobs (housewife, tending agricultural land, cooking) that do not contribute cash income to the household. However, occupational diversity was higher in Nueva Armenia than in the other two communities (n = 14), with 6 jobs in the formal sector (Figure 3). This is a result of the close proximity to La Ceiba for training and salaried employment. The vast majority of households in Nueva Armenia have only one different occupation (58%) and only one wage earner (55%) suggesting that income generating activities are less influenced by seasonality. 21% of respondents have no wage earners living in the household, and are entirely reliant on remittances. However, the average monthly expenditure of the community has increased significantly since 2007 to 5697.99 lempiras (\$308.00).

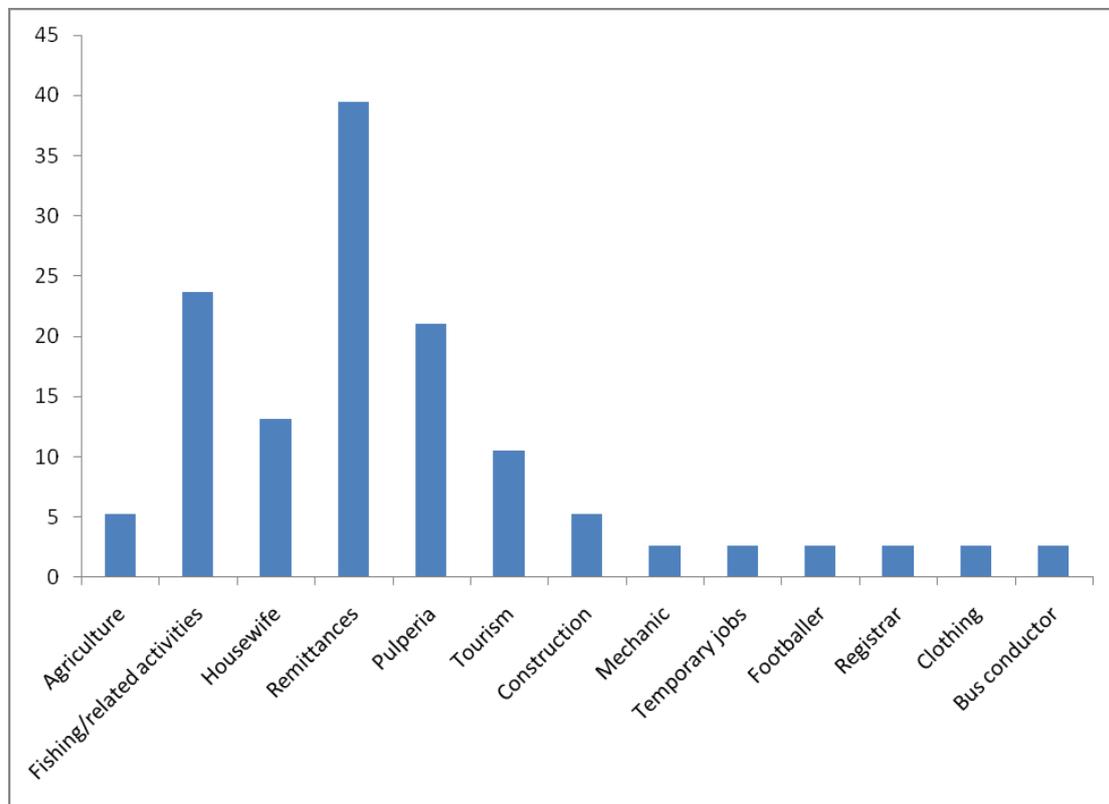


Figure 3: Percentage of occupations for respondent households in Nueva Armenia (n=38)

Tourism was only mentioned as an occupation for men by one respondent, and not listed at all as an occupation for women; nonetheless it contributes 9% of income across the community. However, tourism as an income generating activity has decreased across this community, with only boat owners and hotel owners currently benefiting from the limited tourism in Nueva Armenia. This decrease can also be attributed in part to the loss of income generated by Operation Wallacea groups staying overnight in community houses. This seasonal tourism has not been replaced/countered by any other form of tourism.

### Community Livelihood Structure

The livelihood structures of the coastal communities show some significant changes since 2007. First, the occupational diversity has been reduced with the majority of households surveyed engaging in only one income generating activity. This result is contradictory to the livelihood structure of fishers' households where a greater diversity of occupations are undertaken to reflect the seasonality of the different activities. Therefore these households have less potential to mitigate problems and losses associated with particular activities. However, the results demonstrate a greater dependency on external sources of money to supplement household income, enabling this strategy to be adopted. Second, the mean number of earners per household has decreased while the dependency on remittances has increased. This would suggest that adults capable of earning an income may have moved out of the community to earn a living elsewhere, maintaining the household via remittances. Third, there has been an increasing reliance on traditional income generating activities in the coastal communities as part of a livelihood structure, although based on a subsistence level of income. There are tourism facilities in each community, however the benefits of tourism seems to be contained within a few families that belong to cooking and fishing groups. Therefore, our survey which randomly selected households, demonstrates that the wider community feel that tourism does not contribute significantly to their income.

The livelihood structure of Chachahuate, an island community, has remained largely unchanged and is still dominated by fishing and tourism. Since 2004, Chachahuate has received more external funding and support to develop tourism projects than the coastal communities because it was considered to be the most impacted community by the MPA. Tourism facilities on the island have been established for a number of years, and there is a consistent tourism trade throughout the year making further changes to the livelihood structure of households in this community unnecessary.

### Household monthly expenditure

Household monthly expenditure is taken here to be a proxy of the monthly income because there is no form of monetary saving in these communities. There is some investment in housing and equipment for income generating activities, but these investments were accounted for within the expenditures calculations. Table 3 shows the changes in household expenditures between 2007 and 2009. The changes to the livelihood structure in both Rio Esteban and Nueva Armenia are explanatory factors for the increase in mean monthly expenditure across households. In both communities, remittances, fishing and agriculture contribute significantly to the household income. In Chachahuate, the mean monthly expenditure only increased by approximately \$10 per household, therefore income has remained unchanged. The similarity of both expenditures and household occupational structure for Chachahuate confirms the reliability of the data and data collection methodology, and serves as a control community to assess livelihood structure and income.

Table 3: Change in mean monthly expenditure per household per community.

	Honduran lempira/month 2007	US \$/month 2007	Honduran lempira/month 2009	US \$/month 2009
Chachahuate	4502.1	240.76	4645.72	251.12
Rio Esteban	3235.55	173.2	6013.38	325.05
Nueva Armenia	3846.87	205.72	5697.99	308

To gain an accurate understanding of the importance of activities for income to the communities, an assessment has been conducted to measure the percentage contribution to the income of the household per activity, the mean number of people dependent on a specific activity within a household (Full-time Equivalents, FTEs), and the monetary value of the activity. In this way, it is possible to compare the importance of each income generating activity across effort, human dependency and value. In Chachahuate (Table 4), fishing has the greatest importance across all three categories: over half of all

the human dependents from the households surveyed were primarily reliant on fishing (mean 4.76 per household), worth an average of \$36.33 per household. In Rio Esteban (Table 5), agriculture was the most important activity for effort and mean value to households, but was less significant than remittances for supporting human dependents (agriculture 18.59; remittances 20.22). Interestingly, although tourism (11.18%) contributed to less than half the effort for income compared to agriculture (26.32%), the number of human dependents was almost identical (tourism 17.04; agriculture 18.59) making this activity significantly important for the population sustainability of households. In Nueva Armenia (Table 6), remittances are the most important source of income across all three criteria, contributing almost double the economic value of all other activities (\$30.42). In this community, the informal pulperias contribute the second highest economic value to households, and support the third highest number of human dependents (behind fishing). This is important because it demonstrates the dominance of the informal sector for community income.

Table 4: Chachahuate

Total community	Mean value	Agriculture	Remittances	Fishing	Tourism	Pulperia
1200	% income	0	0	39.09	33.18	14.55
70	Mean FTEs	0	0	39.64	29.64	12.29
72.19	\$/week	0	0	36.33	27.55	14.36

Table 5: Rio Esteban

Total community	Mean value	Agriculture	Remittances	Fishing	Tourism	Pulperia
3400	% income	26.32	19.12	12.5	11.18	8.09
135	Mean FTEs	18.59	20.22	12.22	17.04	7.04
80.55	\$/week	25.69	18.95	13.38	11.54	6.61

Table 6: Nueva Armenia

Total community	Mean value	Agriculture	Remittances	Fishing	Tourism	Pulperia
3800	% income	4.47	35.26	17.89	8.95	14.61
213	Mean FTEs	4.18	31.78	20.56	10.05	13.50
74.42	\$/week	10.44	30.42	16.80	9.71	17.26

This analysis demonstrates that certain activities have higher importance in terms of economic benefit, while other have a much more important role in supporting the largest number of human dependents across the community. As such, the importance of each activity can be stated in both social and economic terms. The informal sector occupations (agriculture, remittances, fishing, pulperia) undertaken in all three communities support a substantial number of FTEs, contributing more to the local economy than any formal occupation. The only formal occupation that was within the top 5 livelihood options in all three communities is tourism, however it only makes a significant contribution to the economy of Chachahuate (almost equal to fishing). The high degree of reliance on remittances as part of household income for Garifuna families has been valued at \$270 million in 2005 for Honduras alone, a figure which is likely to have increased (although there is currently no official figure available). Over 100,000 Garifuna immigrants live in the US, with a significant number of Garifuna living elsewhere in Honduras. Their contributions to the local economy allow the communities to be economically sustainable, which has caused a decrease in the number of community-based livelihoods undertaken in households.

**5.2.2 PROJECT OBJECTIVE 2:** To assess the social capital and cohesion of the local communities for participation within the decision-making for the management plan.

**5.2.2.1 Indicator: Internal and external relationships of households in each community as a measure of social capital and cohesiveness (families, groups, trust).**

Garifuna families have strong links within each community, and maintain many extended relationships with members outside the community. These relationships are significant for households as many family members now living outside the community provide income in the form of remittances. Immigration and out-migration of community members and non-Garifuna families may impact on the level of social cohesiveness if interaction within the community is disturbed. Immigration of Garifuna to the US has caused a decline in the number of community-based livelihood options undertaken by households, which while maintaining economic sustainability has the potential to erode community traditions and cohesiveness. Formal and informal groups within the communities provide mechanisms for communication and information flow, and are highly important for natural resource management. The communication networks are important to enable managers to understand how certain information is transmitted around a community, and if these mechanisms are functioning appropriately. It offers a method by which representativeness of the wider community can be assessed. These networks function through trust and reciprocity, which is determined by the strength of relationships, which are key measures of social capital.

**Familial networks**

**Chachahuate**

In Chachahuate, only 50% of households have family members living within the same community, far less than the other communities. This is attributable to the relative size of the community, and very strong familial links with Nueva Armenia. 92% of households have family members living outside of the community, of which 67% are living in other Garifuna communities. The percentage of out-migration from Chachahuate is low, only 15%, which was seasonal migration to Mexico by young male fishers to work on commercial trawling vessels because there are better opportunities for employment outside the community. However, respondents also believed that 15% of the community have moved in to Chachahuate from other communities. There were no negative consequences stated as a result of migration, but a perception that the general quality of life has increased.

**Rio Esteban**

In Rio Esteban, 90% of households have family members living within the community, and more specifically within their neighbourhood. This provides strong familial groupings across the community. Families are highly interlinked through marriage making extended familial networks throughout the rest of the community. 100% of respondents have family members living outside of the community, with the vast majority (82%) living somewhere else in Honduras (majority in the main cities). A significant portion of respondents have family members in other Garifuna communities (38%) or in the US (41%). Although all respondents stated that they had a family member living somewhere other than in Rio Esteban, the respondents perceived that the percentage of people moving out of the community was quite low, only 35%. Significantly, 68% of those leaving the community are categorised as youth (16-24) because there are no job opportunities in Rio Esteban. The respondents believe that an even smaller percentage of people are moving into the community (15%), mainly from within Honduras. However, when asked who these people were, respondents found it very difficult to classify immigrants to the community, with the most frequent response being original community members returning from elsewhere (21%). Therefore, there are twice as many people moving out of the community than are moving in or returning. This has a significant impact on the ability of the community to generate and maintain alternative livelihoods for future generations. This is supported by the importance of remittances in Rio Esteban as discussed in section 5.1, and reinforced by 29% of respondents who believe that remittances are the most important positive effect of migration, provided by job opportunities outside the community. Interestingly, tourism and associated crime were stated by respondents as negative impacts of migration.

**Nueva Armenia**

In Nueva Armenia, 66% of respondents have immediate and extended family living in the community, with 76% of those living within the same neighbourhood. 66% of respondents also stated that they have immediate family members living outside the community, and 34% with extended family members living somewhere else. Similarly to Rio Esteban, the majority of those family members are living somewhere else in Honduras (45%), in the US (26%) or in other Garifuna communities (24%). The

percentage of people moving out of the community is perceived to be only 15% to work on commercial fishing vessels in Mexico, the same as Chachahuate. However, there is a general perception that the number of people leaving Nueva Armenia is superseded by the number of people moving in (20%). 16% of those moving into the community are believed to come from other Garifuna communities, principally Chachahuate, and 42% are non-Garifunas from within Honduras. Therefore, there is a higher proportion of people moving into the community than there are moving out, which should improve the ability of the community to generate and maintain alternative livelihoods. However, this also increases the competition for limited resources and income opportunities within the community. Remittances and an increased quality of life were recognised by a handful of respondents as positive influences of migration. However, increased crime and loss of family closeness were given as negative impacts of migration. Therefore, in Nueva Armenia, in-migration has the potential to weaken the existing community cohesiveness through a loss of familial links and associated networks.

**Formal and informal networks for communication – community groups**

**Chachahuate**

There were 9 community groups identified by respondents in Chachahuate (Figure 4), two of which have a recognised legal status and are considered as formal groups (Patronato and fishing). However, the dancing group is the most widely known group in the community (which is a similar result to 2007) with an estimated community membership of 10%. Interestingly, the cooking group was not widely mentioned by respondents, but is estimated to have membership of half the community. Cooking for tourists also accounts for 50% of the livelihood options in Chachahuate as detailed in section 5.1. Therefore, this informal group is very important economically for the community, but is not considered important by respondents for information sharing and communication (17%). The two formal groups ~~previously~~ mentioned are considered to be of importance to make community decisions regarding natural resource management, and a strong source of information for respondents (42%). This is because the community is considerably small enough to allow for the majority of members to be present during community meetings, relying far less on word of mouth than the larger communities.

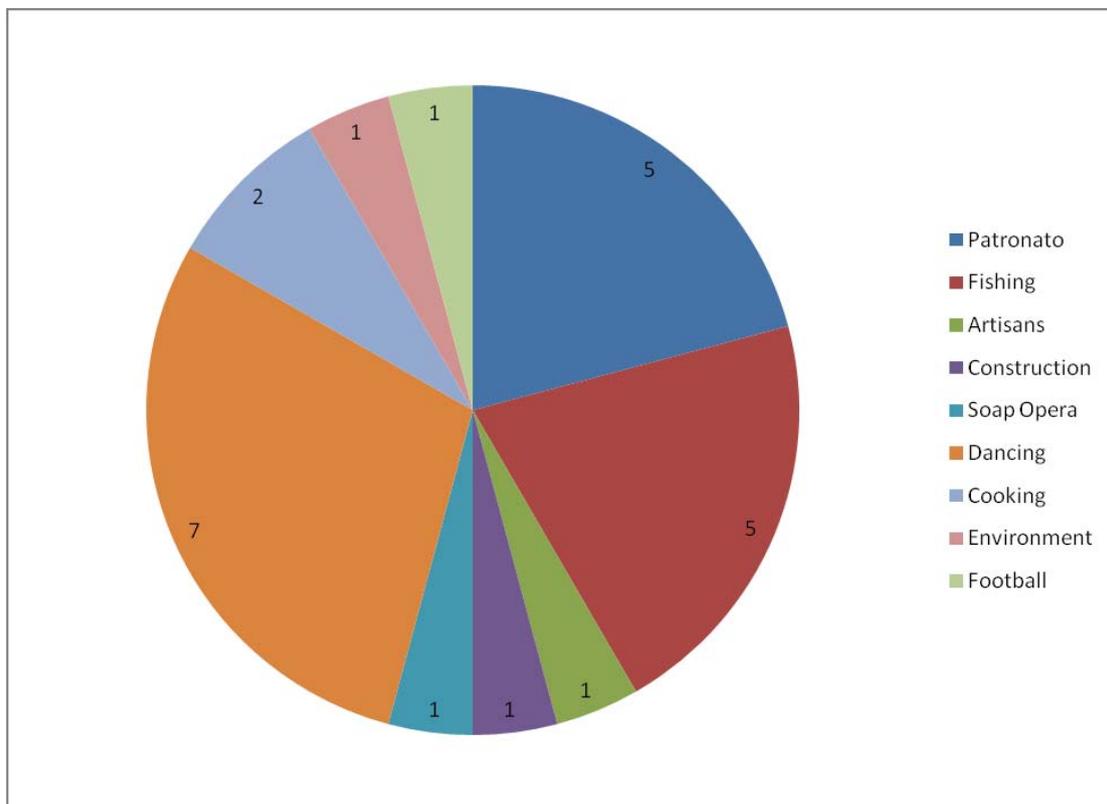


Figure 4: Number of responses for each community groups recognised by respondents in Chachahuate.

**Rio Esteban**

There were 11 community groups identified by respondents in Rio Esteban (Figure 5), three of which are formal groups (Patronato, fishing, and teachers). The dance group was the most widely known of the community groups (71%) with half of the community estimated to be members. The Patronato in

Rio Esteban was also highly recognised (68%), but with an estimated membership of only 20% of the community. Unsurprisingly for a community not dependent on fishing, only 21% of respondents were aware of the fishing group. The water group was not recognised by many respondents (15%), however, those individuals believed that over 35% of the community were members of this group. Therefore, it has a strong position for informal networks in the community. The formal groups in Rio Esteban were considered to be the most important for information flow through the community, along with the dance group, of which every other household has a member. This informal system for passing on information by word of mouth is the strongest channel for communication in Rio Esteban, with 82% of respondents stating that they receive community information this way.

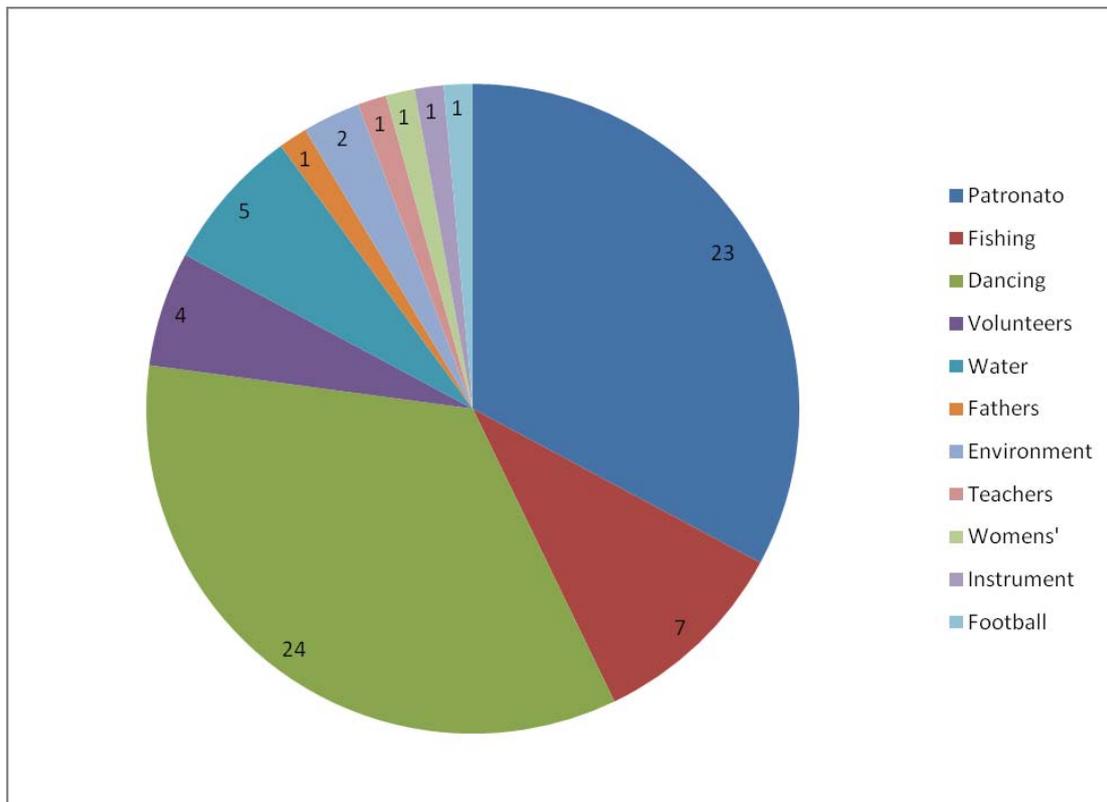


Figure 5: Number of responses for each community groups recognised by respondents in Rio Esteban.

### Nueva Armenia

Nueva Armenia has the highest number of groups identified by the respondents, with 14 in total (Figure 6). Of these groups, the same three groups are formalised with legal status as in Rio Esteban (Patronato, fishing and teachers). Again, significantly, the dancing group was recognised by the greatest number of respondents (61%), and up to 75% of the community are believed to be members (which would suggest a female dominated community). The Patronato was not highly recognised in comparison with the other two communities (37%). This is because during 2009, there has been a dispute in the community between the 'old' Patronato and a 'new' Patronato. This dispute has arisen because the old Patronato failed to hold an election after two years in power which is legally required. Therefore, some of the community no longer recognise this Patronato and its members as the elected leaders of the community. However, the 'new' Patronato are unpopular with the majority of the wider community, containing a number of powerful individuals. Therefore, the Patronato as a formal group and its associated authority has been weakened in Nueva Armenia. However, 37% of respondents stated that they receive the majority of information concerning issues in the community via community meetings with the Patronato. Interestingly in this community, the fishing group is estimated to have over half of the community as members, but officially only has twelve members in the cooperative. Therefore, it is evident that familial fishing 'groups' are considered in the same terms as the fishing cooperative in Nueva Armenia. Two of the largest groups in the community for estimated membership are the womens' group (60%) and the football group (70%); however these were rarely mentioned by respondents. This is possibly because they are groups which have a significant social meaning in the community through informal interactions, and are not recognised by respondents as being a 'group'. However, these groups are a strong part of the female dominated informal network which allows information to be passed around the community by word of mouth (53%).

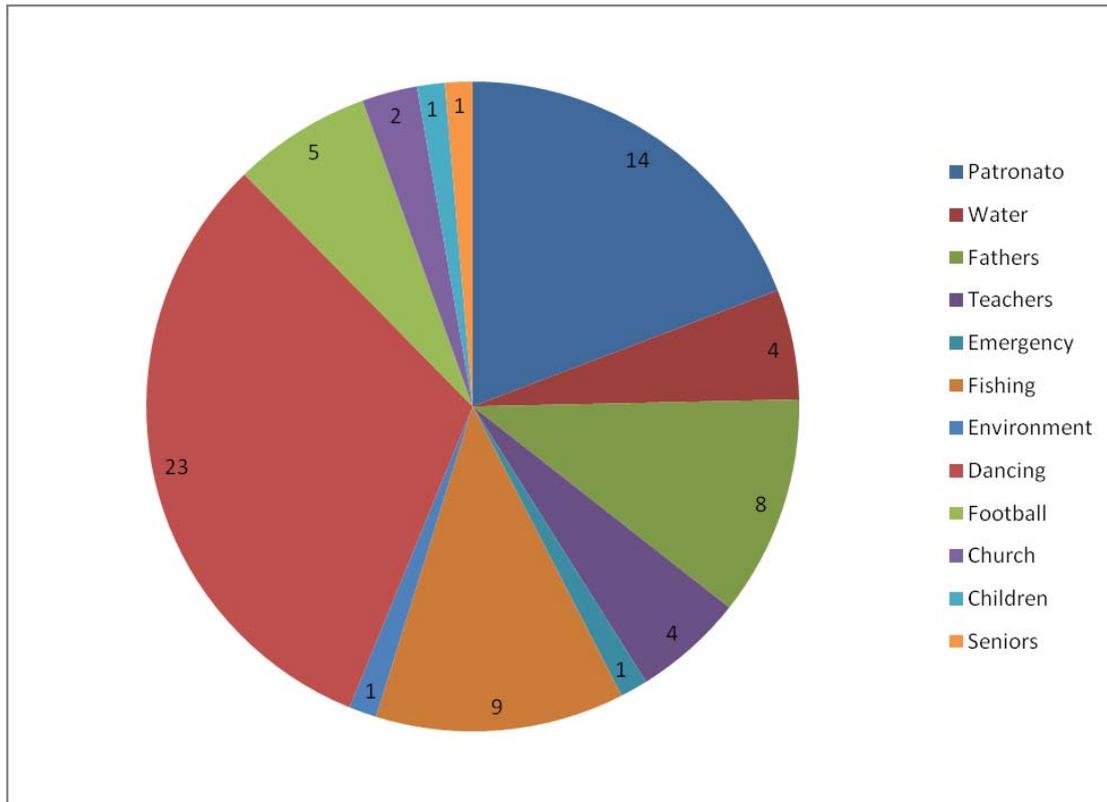


Figure 6: Number of responses for each community groups recognised by respondents in Nueva Armenia.

## Measures of trust

### Chachahuate

Chachahuate has a relatively high level of trust between community members (58%), attributed to the peaceful nature of the community. However, several respondents mentioned dishonesty as an attribute associated with the community. This community demonstrated the greatest level of cooperation between households, with 50% of the respondents believing that the community works better together rather than as individuals. This is because the community has a successful tourism industry based on cooperation between households to maintain the restaurant, and fishers working together to maintain the hotel.

### Rio Esteban

Rio Esteban has the highest level of trust between community members, with 59% of respondents believing that the community is honest. However, 44% of respondents stated dishonesty as a cause of conflict within the community. Interestingly, despite this high level of trust, 79% of respondents (higher than any other community) perceive that the community functions better when working individually than in cooperatives. At the time of field work, there were problems in the community between three different fishing groups trying to merge into one larger cooperative. This was creating tensions because of differences in opinions (26%) and the loss of power and responsibility of each groups' members (15%). Therefore, only 21% of the respondents believed that working in cooperatives yielded any benefits.

### Nueva Armenia

Nueva Armenia has the lowest level of trust between members of the community (29%), with 71% of the respondents believing that other members of the community are dishonest. Reasons stated for this lack of trust were the poor unity of the community and social splits as a result of the Patronato situation in 2009. However, 42% of the community believe that working in cooperatives has more benefits than working individually, offering strength because of the democratic processes of election. However, the small majority (58%) believe that working individually has more benefits because there are no differences of opinions, problems with sharing profits or loss of responsibility over resources.

**5.2.3 PROJECT OBJECTIVE 3:** To investigate the suitability of existing governance and legal frameworks for successful implementation of the management plan through a period of transition to the second management phase.

**5.2.3.1 Indicator: Existence and activity level of community organisations**

The ability of a community to effectively participate in management decisions for an MPA is largely determined by the existence and organisation of suitable groups within the community. This organisation is vital for representing community interests to management, and influencing the outcome of management decisions (Pomeroy *et al*, 2004). Understanding community level groups and activity levels can facilitate greater participation in management, and lead to greater compliance with MPA rules and regulations.

There are only three suitable groups that would be able to take part in management decisions for the CCMPA: 1. the Patronato, the local community-level government organisation, 2. fishers' cooperatives, and 3. Communities Commission of Fishers.

1. The Patronato consists of one Head member, and up to twelve members elected from the community, each with responsibility for certain community affairs, i.e., health, water, business. Each Patronato will serve a term of two years before an election is called. The members of ~~these community these communities~~ Councils remain fairly constant, being re-elected to serve under a different position. Patronato members are not directly involved with the HCRF despite official communication from the HCRF going through this channel. Instead the Patronato delegates management responsibility to the fishers' in the community.

2. The fishers' cooperatives have a high degree of organisation within themselves, often contributing a percentage of earnings into a shared bank account to pay for new equipment, or repairs of shared equipment. This level of organisation has occurred as a result of a donation by the Japanese government in 2004 via the project MODEPESCA. This was specifically designed to aid artisanal fishers along the coastline of the Municipality of Atlantida. The project offered twenty-five foot boats and fishing equipment (nets which have since been banned under the rules of the management plan) for fishers only in cooperatives. Therefore, many individual fishers formed cooperatives in order to qualify for these funds. Cooperatives from both Sambo Creek and Nueva Armenia received the greatest proportion of help from this project, and have since started to use the boats to transport tourists to the Cayos Cochinos. These cooperatives were also approached by the HCRF during the initial management plan meetings, and remain the principal contacts that have communication with the HCRF. However, all three communities in this study have internal problems within their existing fishing cooperatives, resulting in the loss of legal status as a cooperative. Therefore, fishing groups exist at present, each with the same members as the previous cooperatives. However, the collapse of cooperative functioning illustrates the frictions that are present between members based on trust and power.

3. A new Commission of Fishers , a council representing all of the communities within the area of influence of the CCMPA, was created and strengthened in the new management plan introduced in 2008. The members of the Commission are all elected from existing fishing groups in each community, and are tasked with regulating the management of the CCMPA by the HCRF. These members are powerful individuals who have traditionally ~~maintained good~~ maintained good relationships with the HCRF, and are accused of serving their own self-interests rather than representing all fishers (individuals and groups) in their respective communities. However, the Commission is a functional organisation which has regular contact with the managing agency and has the ability to participate in the decision-making process.

Therefore, both the Patronato and fishers' cooperatives would provide strong organisations from all communities that could participate to a greater degree in management decisions and planning. However, these groups would also need to represent the views and opinions of all fishers in each community, and the Head of each Patronato would need to be constantly involved with HCRF activities in order to transfer information to the wider community. This would improve community understanding of the HCRF and the management plans, and also encourage greater community interest in the marine resources.

**5.2.3.2 Indicator: Existence and adequacy of enabling legislation**

The existence and adequacy of enabling legislation will provide a management plan with the legal

framework that enables the goals and objectives to be recognised, enforced and accountable. The identification of this framework ensures that the management plan is successfully implemented, and where possible incorporates existing local traditional laws (Pomeroy *et al*, 2004).

The legislation to legalise the CCMPA is centralised in COHDEFOR, the government agency responsible for the management of all protected areas in Honduras. The management plan of any protected area in Honduras must also be internalised through COHDEFOR and subjected to scrutiny by the National Congress before it is formally accepted in order to ensure that it fulfils the international and national requirements. The accounts for each protected area and its managing agency are also supposed to be audited internally by personnel from COHDEFOR. This should ensure that all of the resources for conservation and administration efforts are accounted for correctly. Uniquely for the CCMPA, because it is entirely privately owned, the title deeds for the land of the CCMPA are subject to a conservation order which documents that the islands and associated marine resources must be conserved.

The first management plan of the CCMPA was not internalised within COHDEFOR, instead it went straight to Congress where it was passed as a legally binding document. However, the second management plan followed the official protocol and was produced in conjunction with ACF (formally COHDEFOR) who were present at all the meetings during 2007. Similarly, personnel from SERNA and DIGEPESCA were also present which has strengthened the management process, making the regime fully co-managed between the state, HCRF and community user groups.

The strength of the responsibility of COHDEFOR is further compromised by the political situation in Honduras. Changes of the dominant political party occur frequently, almost at every general election (every five years), bringing with it re-structuring of government agency personnel. Therefore, knowledgeable staff members are moved into different job roles or removed completely until a subsequent change back to the previous party. This situation results in a frequent turnover of personnel, and a lack of consistency for implementation of regulations. This effect is further compounded by the political disturbances created by the military coup in June 2009. The resultant election has provided another change in party leadership, with a National Party government now in power.

**5.2.4 PROJECT OBJECTIVE 4:** To evaluate the community benefits of the CCMPA through alternative employment opportunities, existing levels of tourism and to explore future business opportunities.

Principal sources of household income are important to understand stakeholder characteristics which explain how people use the resources available to them to make a living for themselves. Changes in sources of income may indicate positive or negative outcomes from the MPA, or may show exogenous changes influencing the community. This is also a measure of community dependency on resources which could influence management decisions and training programmes (Pomeroy *et al*, 2004). The managing agency needs to ensure that communities have adequate means for livelihoods and incomes derived either from natural resources or as alternative options.

**Existing levels of tourism and associated infrastructure**

**Chachahuate**

Chachahuate currently has the highest level of tourism of all three study sites, accounting for half of livelihood income, and with the highest proportion of people involved within the community. 58% of respondents believed that everyone is involved with tourism, and 75% of respondents believe that 60% or more of the community benefit from tourism. The current infrastructure associated with tourism on Chachahuate includes a one-storey hotel for overnight stays, a restaurant, three purpose built latrines and fishing boats for use as transport. Therefore the main activities and products available for tourists in Chachahuate include an overnight in the hotel and traditional food in the restaurant. However, respondents believed that Punta dancing (33%) and jewellery (25%) are the main tourism attractions. Only 33% of respondents in Chachahuate had heard of the term ‘ecotourism’, but those that did had a good understanding of it’s meaning stating that it was a form of tourism with nature. Respondents in this community are more aware of tourism advertising than in any other community, with 66% of respondents stating that information about Chachahuate is available for tourists on the internet and on television because of the filming of the reality show ‘Survivor’ in the CCMPA. As a result of a greater exposure to tourism and its benefits, the majority of respondents acknowledged that tourism has had positive impacts of different aspects of their lives as shown in Figure 7. Tourism is viewed to have had a positive impact on traditions, the wider economy, overall quality of life and services. When asked what respondents’ ideal jobs would be, only three people said tourism, while a further six stated cooking. However in this instance, cooking can be taken as a proxy for tourism as all cooking on Chachahuate is for tourists in the restaurant.

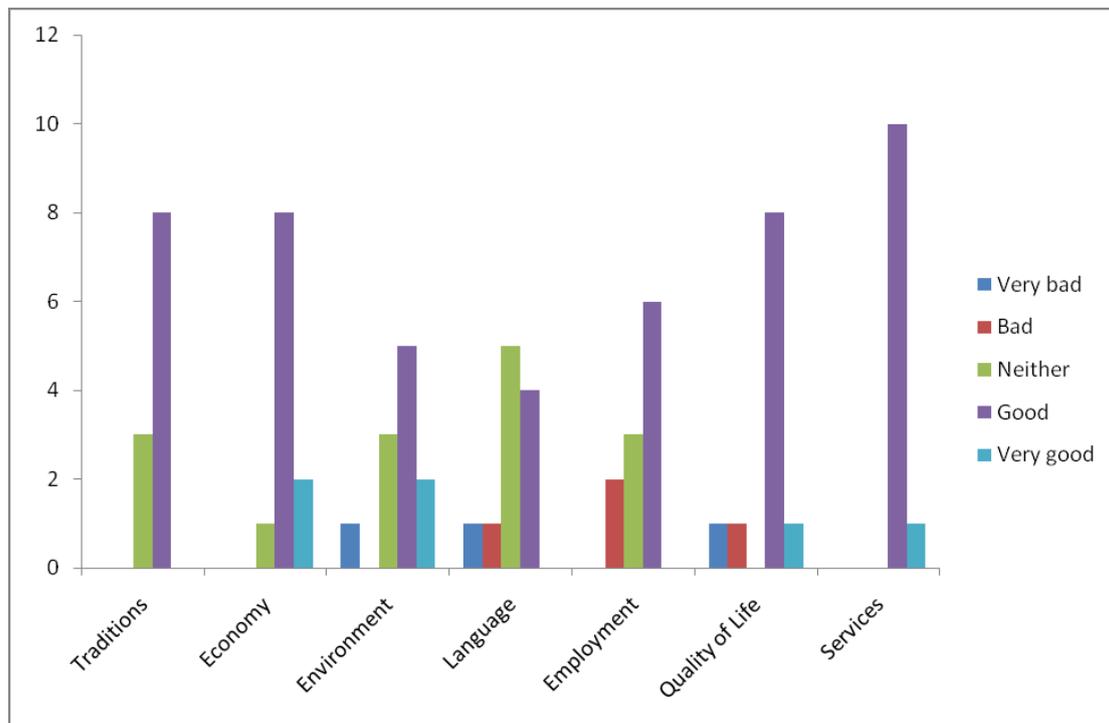


Figure 7: Likert responses for the effects of tourism on the lives of respondents in Chachahuate.

### Rio Esteban

Rio Esteban is currently the community that receives the most seasonal tourism from Operation Wallacea students staying overnight in the community. These overnight stays accommodate hundreds of students per visit in many homes spread throughout the community distributing tourism revenue across the community. However, the vast majority of the community (65%) believe that there is very little tourism in Rio Esteban, and presently less than 20% of the community benefits from any form of tourism. Respondents in Rio Esteban believe that the benefits of tourism are currently only experienced by those directly involved in tourism, specifically members of the Patronato. In spite of this perception that few members of the community benefit directly from tourism in economic terms, respondents were aware of the wider benefits they receive as detailed in Figure 8. Benefits were associated with the wider economy and community services, as well as environmental protection. While it is true that Patronato households are used for homestays in the community, many other households are also included in the homestay tourism. However, restrictions are placed on the quality of the housing in which to place students, therefore exacerbating the pre-existing wealth divide in the community. This form of tourism favours those community members that are wealthier and own the better standard housing. This perception that the community has a low level of tourism is validated by the limited tourism infrastructure currently available for tourists. There are two hotels that are currently closed, and the previously used cabanas on the beach have been dismantled because there was no capacity training to show the community how to maintain the buildings. Despite the low levels of tourism experienced in the community, respondents in Rio Esteban had the greatest appreciation of ecotourism, with 68% of respondents having heard the term. However, understanding of the meaning of ecotourism was varied along a spectrum of working together to living with nature.

The current activities and products available to tourists include Punta dancing (26%) and traditional foods (18%), both of which are used during Operation Wallacea overnight visits. A future product identified for tourism was cassabe bread, a product which is already sold throughout Honduras and in the US. Respondents in Rio Esteban suggested the greatest number of other products and services that could be used for tourism, including basket weaving, car rentals, countryside tours and horse riding. This community also had the greatest range of identified training needs in order to improve tourism including hygiene, languages, administration and equipment maintenance. However, the majority of the community have little understanding of advertising for tourists, believing that word of mouth is the main mechanism by which tourists can find information about Rio Esteban (53%). When asked what the respondent's ideal job would be, only two people stated tourism (6%), while the most popular responses were being a housewife (18%) or doing nothing (12%). These responses illustrate the dependency on remittances in Rio Esteban, and a lack of willingness to be employed.

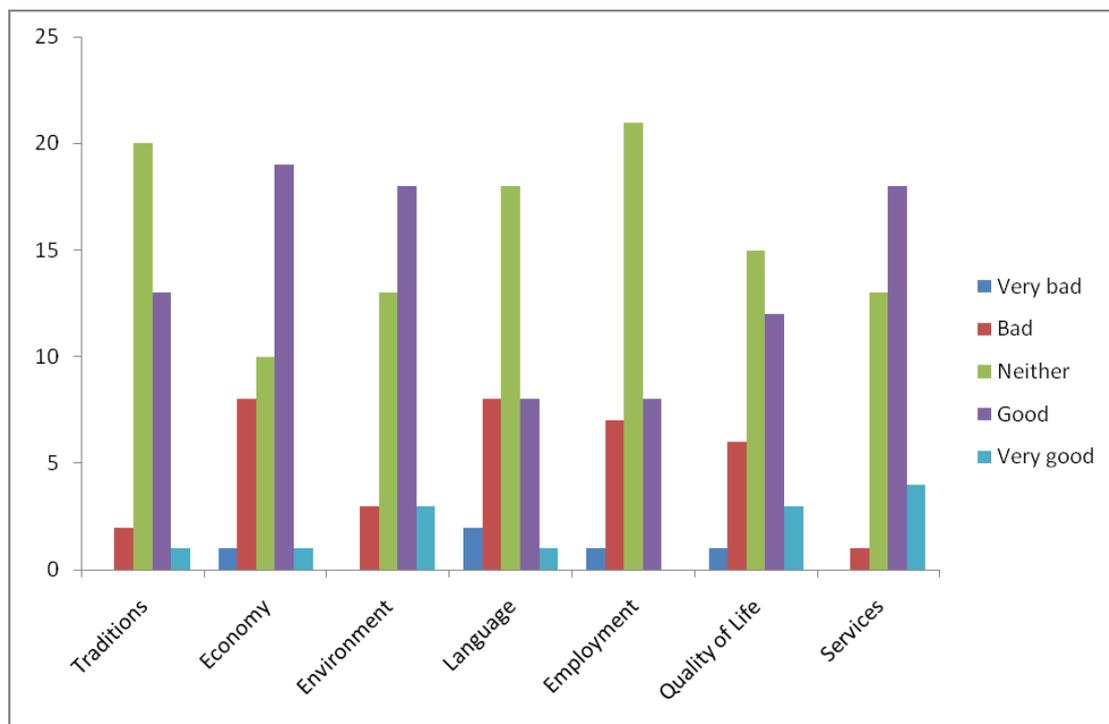


Figure 8: Likert responses for the effects of tourism on the lives of respondents in Rio Esteban.

### Nueva Armenia

Nueva Armenia is not longer used for overnight accommodation of Operation Wallacea students, and as such is now perceived to have very little tourism activity (45%). The majority of tourism currently experienced by the community is day trips to the Cayos Cochinos (32%) and cultural displays of Punta dancing for those tourists. However, tourism in Nueva Armenia is only beneficial for boat owners, those in the fishing group or hotel owners, with 63% of respondents believing that less than 40% of the community derive any economic benefit from tourism. Homestays are not used as an option for accommodation to tourists at present, only during visits from Operation Wallacea students as part of the social science research group. The current tourism infrastructure includes two hotels, multiple restaurants and bars, and fishing boats used as transport to the Cayos. However, the 'new' Patronato are planning to build a dock facility to increase the capacity of the community to receive overnight and day trip visitors to the Cayos Cochinos. Only some of the respondents in Nueva Armenia had heard of the term 'ecotourism' (32%), the lowest of all the study sites. However, of those that were aware of the term, there was a high level of understanding of its meaning. These respondents, along with community leaders, had an appreciation that a community wide understanding of ecotourism is necessary in order to increase the level of tourism and benefits for all. Despite this perception, the majority of respondents did accept that tourism had generated wider benefits for the community (Figure 9), including services, the economy and environmental conservation.

Suggested activities and products that could be used for tourism in Nueva Armenia included basket weaving, cultural shows and traditional foods which are similar to Rio Esteban. However, development of more engineering and mechanical training courses were favoured by respondents as a successful scheme has been implemented for the youth in this community by GAD to provide longevity of employment. The training needs of the community were also considerable including hygiene, languages, local ecological knowledge, administration and cooking for western tourists. However, the greatest response was for customer service training, a skill that is lacking in Nueva Armenia. However, there is an expectation that this training should come from outside the community and be funded by external agencies rather than a responsibility of the community itself. Respondents had a high level of understanding of where tourists can find information about the community, stating the internet as the main source (42%) and the tourism office in La Ceiba (21%). Therefore, Nueva Armenia has an appreciation of tourism as an alternative option for livelihoods in the community, and shows a level of reflexivity concerning why its tourism industry has diminished. However, when respondents were asked what their ideal jobs would be, only two people stated tourism or a related activity. The most given response was to be a chef in nearby hotels and restaurants (21%), taking tourism out of the community.

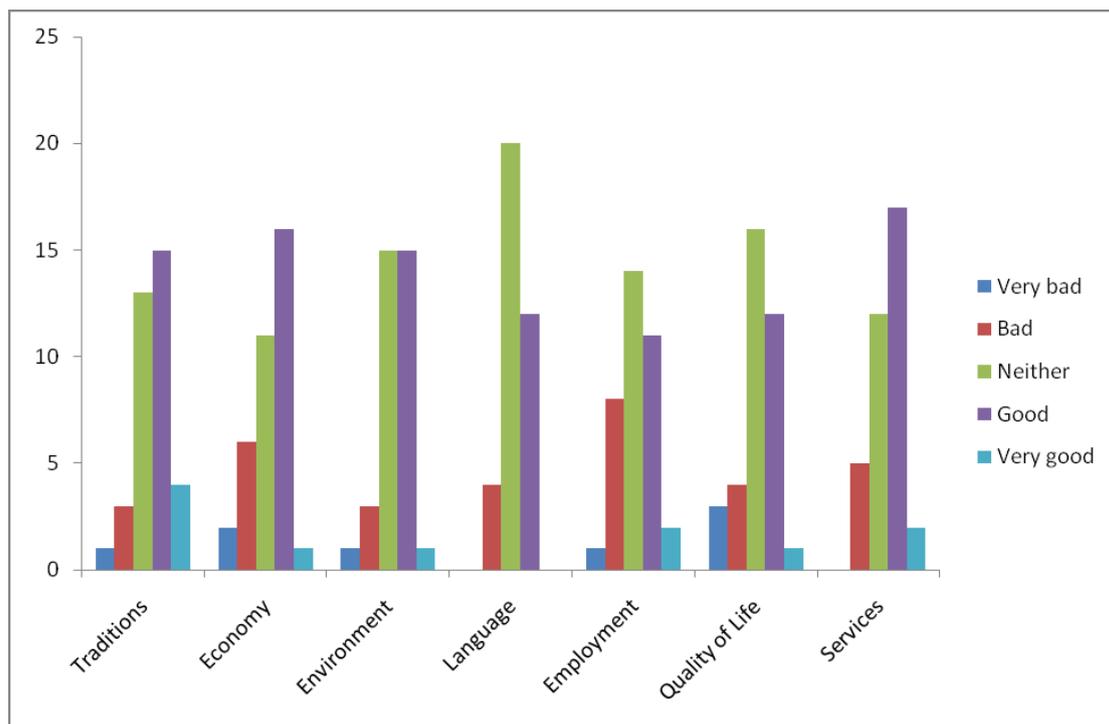


Figure 9: Likert responses for the effects of tourism on the lives of respondents in Nueva Armenia.

**5.2.5 PROJECT OBJECTIVE 5:** To assess the potential use of the Wildlife Conservation Product (WCP) scheme to encourage community wide alternative employment opportunities.

The Wildlife Conservation Product (WCP) scheme has been introduced in forestry communities in Honduras as an alternative trade organization-inspired mechanism that contractually binds a community to the ecological preservation of its natural resources for the returned assurance of local produce purchases at fair trade equivalent prices. After paying member farmers for their produce at a standard international price, the fair trade differential is pooled and divided equally amongst the members of the village-level cooperative – thus extending benefits to the village as a whole (Fridell, Hudson & Hudson, 2008). This process represents an explicit alternative to the conventional production and exchange model of the international free trade market and acts as the unifying agency between producers and consumers. The scheme was included in the social science research in 2009 to conduct a pilot survey to identify potential products in Garifuna communities that could be produced for export and aligned with the regulations of the CCMPA for improved conservation.

Only one community was found to produce a viable product - cassabe bread in Rio Esteban. This is an organic product, indigenous to the Garifuna employing a specific technique to create the flatbread. The product is also robust and can be stored for up to one year before consuming. It was found that over 80% of the women in the community are already members of a cassabe making group that sell their produce in La Ceiba, and have utilised a middleman to export the product to the US. At present the group is expecting a government grant to build a cassabe factory, the first of its kind in Honduras. Yet, all the respondents interviewed identified the need for external help to export the product overseas, recognising that they lacked this expertise within the community. However, as discussed in section 5.2, 79% of the respondents also believed that the community functions better when working as individuals. Interestingly, the womens' cassabe group functions as a collection of individuals because it does not have legal status as a cooperative. Should the community receive the government grant for the factory, it will be a requirement that the group seek this legal status and become a cooperative. In this way, the newly formed cooperative will require significant capacity training in order to maintain its functioning. Although the product exists in Rio Esteban to be incorporated into a WCP scheme, there is little dependency on the natural resources of the CCMPA, with only 28% of all fishing being conducted within the protected area. Therefore, a scheme that requires over 80% of all community members to agree to adhere to conservation measures will lack sufficient support in Rio Esteban. Alternatively, linking the scheme to conservation regulations for the CCMPA could be relatively easy because the few people who fish in the CCMPA will actually necessitate submitting to the rules. In this way, should the scheme be introduced in this community, additional conservation measures for the surrounding mangroves, forests and estuary should be incorporated into the contract.

Similar products were produced in Nueva Armenia, but not in sufficient quantities or numbers to be suitable for the WCP scheme. In addition, and of greater significance, the lack of community cooperation and trust in this community would prevent the scheme from being successful. Individual self-interest was more commonplace than collective action, as discussed in section 5.2. The fishing cooperative has also collapsed in Nueva Armenia as a result of mistrust and abuse of powers by its members, a situation that has occurred multiple times in the community with other cooperatives (womens' group, milk producers and a community general store). As one key informant stated, it is better to have four of five people in a cooperative, preferably family members who can be trusted, otherwise people lose a sense of responsibility for the other people. Therefore, without improvements in the social capital and trust within the community, a WCP scheme would be unsustainable. Interestingly, Nueva Armenia has a significantly greater reliance on the resources of the CCMPA for livelihoods, with over 60% of all fish catches coming from inside the protected area. In this way, the WCP scheme would be highly beneficial for reinforcing conservation regulations for the CCMPA. Therefore, for the WCP scheme to function in Nueva Armenia, there needs to first be investment in capacity training in the community to maintain working relationships and promote cooperation.

Chachahuate does not have the capacity to produce any products that could be traded or exported as part of the WCP scheme because it lacks natural and human capital. However, the principles of the scheme could be applied to the current tourism activities in the community in order to promote better compliance with current conservation measures. The majority of all fish produce in Chachahuate comes from inside the CCMPA (70-80%) and there is a history of poor relations between fishers in this community and the HCRF. Therefore, a community-wide scheme to promote conservation regulations could significantly improve the compliance of fishers in this community.

## **6. DISCUSSION AND RECOMMENDATIONS**

The results of this report focus on qualitative analysis of interviews and focus groups with members of the local communities affected by the CCMPA. Although these analyses are not statistically robust, from qualitative assessment the findings have a more significant impact because the collective responses are extremely similar both inter-community, and intra-community (households). Therefore, the information gathered during the 2009 field season that has informed this research is analytically robust.

The results presented in this field report support the hypothesis that the new management plan for the CCMPA is being effective in most of its objectives, and has made significant socio-economic improvements since 2007. There is a move away from traditional activities as the primary sources of income, towards tourism-related activities. However, alternative livelihoods are more available to women than men, and tourism development is not evenly distributed between all communities. However, there is still a clear need to address alternative livelihood options in light of social and cultural changes in the Garifuna communities, accounting for the strengths and weaknesses of social capital within each community. Sustainability of livelihoods was the main source of concern within all communities in light of the events in 2009 which severely impacted the number of tourists visiting the country as a whole.

It is recommended that the HCRF takes into account the social capital available in each community, in light of the trust and cohesiveness between community members that will affect their ability to work together to support and promote conservation measures of the CCMPA. These same values will impact the ability of communities to sustain and maintain any alternative livelihood developments. This is of greater importance in Rio Esteban and Nueva Armenia where levels of trust and cooperation are far less than in Chachahuate because of the larger size of both communities, and higher levels of dependency on remittances for household income. Therefore emphasis should be placed on capacity building and basic training requirements to manage alternative businesses as well as promotion of infrastructure; investment should be made in human and resource capital as well as structural capital.

## **7. CONCLUSION**

It is clear that there have been considerable efforts to initiate sources for alternative livelihoods to diversify dependency away from fishing activities. However, these efforts have not been equally distributed between communities, or to the members of each community as a whole. The fishers are particularly aware that the management plan is having positive ecological benefits for the conservation of target species. However, the short-term financial and social disadvantages continue to create a strong sense of resentment and negativity for the management of the CCMPA. There is already an existing degree of household income multiplicity, providing a framework for the introduction of alternative supplementary sources of income rather than abandonment of traditional practices altogether. Therefore, efforts to promote tourism-related activities should work with existing skills and practices that have been identified in each community, rather than introducing new methods of working. This would provide a more achievable and sustainable method to generate diversified livelihoods for the local communities. However, promotion of alternatives based primarily on tourism face three main obstacles in the current climate: 1. a decrease in tourism trade as a result of natural disasters (earthquake), 2. a decrease of tourism trade as a result of the political crisis to affect Honduras for six months in 2009, and 3. widespread social change as households are more reliant on remittances from family members outside the community and less willing to engage in occupations themselves. Therefore, promotion of tourism based alternatives may make the communities vulnerable to economic and climatic pressures beyond their control. Inclusion of mechanical and engineering training should also be developed in conjunction with tourism to provide an alternative available throughout the year, as has been developed in Nueva Armenia through GAD.

The new management plan has been recognised as the first full co-management arrangement for a protected area in Central America, including representation from the state, government agencies and community user groups. This bottom-up participatory approach, a critical component for success, must allow for a greater involvement of the communities themselves to reflect traditional values and practices. This level of participation would promote a cultural shift in favour of environmental stewardship. Thus, over time, the wider communities of the CCMPA would care for the environment and feel ownership of the marine resources. The improvement to the inclusion mechanisms for the Communities Fishing Commission has begun this process, allowing communities to have a greater voice in the decision-making process.

## **8. REFERENCES**

- Adger, W. N. (2003) 'Social Capital, Collective Action, and Adaptation to Climate Change', *Economic Geography*, 79, (4), pp. 387-404.
- Adger WN, Hughes TP, Folke C, Carpenter SR, Rockstrom, J (2005) Social-Ecological Resilience to Coastal Disasters. *Science* 309(5737):1036-1039.
- Almada-Villela PC, Sale PF, Gold-Bouchot G, Kjerfve B (2003) Manual of Methods for the MBRS Synoptic Monitoring Program: Selected Methods for Monitoring Physical and Biological Parameters for use in the Mesoamerican Region. MBRS, Belize.
- Assessment, M. E. (2005) *Ecosystems and Human-wellbeing: current state and trends*. Washington D.C: World Resources Institute
- Baker, A. C., Glynn, P. W. and Reigl, B. (2008) 'Climate change and coral reef bleaching: An ecological assessment of long-term impacts, recovery trends and future outlook', *Estuarine, Coastal and Shelf Science*, 80, (4), pp. 435-471.
- Bene, C. (2009) 'Governance and decentralization reforms in small-scale fisheries - an African perspective', in *Fisheries, Sustainability and Development*. Royal Swedish Academy of Agriculture and Forestry.
- Berkes, F (1989) *Common Property Resources – Ecology and Community-based Sustainable Development*. Belhaven Press, London.
- Bodin, Ö. and Crona, B. I. (2008) 'Management of Natural Resources at the Community Level: Exploring the Role of Social Capital and Leadership in a Rural Fishing Community', *World Development*, 36, (12), pp. 2763-2779.
- Bromley DW (1992) The commons, common property, and environmental policy. *Environ Res Econ* 2(1):1-17.
- Brondo K, Woods L (2007) Conservation as Development in the Cayos Cochinos Marine Protected Area. *Ecol Environ Anthro* 3(1):31-38
- Bunce L, Townsley P, Pomeroy RS, Pollnac RB (2000) *Socioeconomic Manual for Coral Reef Management*. Australian Institute of Marine Sciences.
- Campbell, L. M. and Vainio-Mattila, A. (2003) 'Participatory Development and Community-Based Conservation: Opportunities Missed for Lessons Learned?', *Human Ecology*, 31, (3), pp. 417-437.
- Carilli, J. E., Prouty, N. G., Hughen, K. A. and Norris, R. D. (2009) 'Century-scale records of land-based activities recorded in Mesoamerican coral cores', *Marine Pollution Bulletin*, In press.
- Charles, A. and Wilson, L. (2009) 'Human dimensions of Marine Protected Areas', *ICES J. Mar. Sci.*, 66, (1), pp. 6-15.
- Cinner JE (2005) Socioeconomic factors influencing customary marine tenure in the Indo-Pacific. *Ecol Soc* 10.
- Cinner JE, Ben J, Marnane M (2005a) Conservation and community benefits from traditional coral reef management at Ahus Island, Papua New Guinea. *Conserv Bio* 19:1714-1723.
- Cinner JE, Clark TH, Marnane M, McClanachan T, Ben J (2005b) Trade, tenure, and tradition: Influence of sociocultural factors on resource in Melanesia. *Conserv Bio* 19:1469-1477.
- Cinner JE, McClanachan TR (2006) Socioeconomic factors that lead to overfishing in small-scale coral reef fisheries of Papua New Guinea. *Environ Conserv* 33:73-80.
- Cinner JE, T, D. and McClanachan, T. (2008) 'Socio-economic Factors that Affect Artisanal Fishers' Readiness to Exit a Declining Fishery', *Conservation Biology*, 23, (1), pp. 124-130.
- Cinner JE, Marnane M, McClanachan T, Almany G (2005) Periodic closures as adaptive coral reef management in the Indo-Pacific. *Ecol Soc* 11(1):31-65
- Cinner, J., McClanachan, T. and Wamukota, A. (2010) 'Differences in livelihoods, socio-economic characteristics, and knowledge about the seas between fishers and non-fishers living near and far from marine parks on the Kenyan coast', *Marine Policy*, 34, pp. 22-28.
- COHDEFOR (2000) *Todos los derechos reservados*. Corporacion Hondurena de Desarrollo Forestal.
- Cooke, I. R., Queenborough, S. A., Mattison, E. H. A., Bailey, A. P., Sandars, D. L., Graves, A. R., Morris, J., Atkinson, P. W., Trawick, P., Freckleton, R. P., Watkinson, A. R. and Sutherland W. J. (2009) 'Integrating socio-economics and ecology: a taxonomy of quantitative methods and a review of their use in agro-ecology', *Journal of Applied Ecology*, 46, pp. 269-277.
- Crabbe, M. J., Martinez, E., Garcia, C., Chub, J., Castro, L. and Guy, J. (2009) 'Identifying management needs for sustainable coral-reef ecosystems', *Sustainability: Science, practice and policy*, 5, (1), pp. 42-47.
- Crona, B. I. and Bodin, Ö. (2006) 'What You Know is Who You Know? Communication Patterns Among Resource Users as a Prerequisite for Co-management', *Ecology and Society*, 11, (2).
- Denning P (ed) (2005) Interim Marine Field Report. <http://www.opwall.com/Library/Honduras>

- Fenny D, Berkes F, McCay BJ, Acheson JM (1998) The Tragedy of the Commons: 22 years later. In 'Managing the Commons', Baden J and Noonan D (eds) Indiana University Press.
- Gray TS (ed) (2005) Participation in Fisheries Governance. Dordrecht, Springer.
- Guzman HM (ed) (1998) Marine-Terrestrial Flora and Fauna of Cayos Cochinos Archipelago, Honduras. *Int J Trop Bio Conserv* 46 Supl 4.
- Harborne AR, Afzal DC, Andrews MJ (2001) Honduras: Caribbean Coast. *Mar Pol Bul* 42(12):1221-1235.
- Imperial MT, Yandle T (2005) Taking Institutions Seriously: Using the IAD Framework to Analyse Fisheries Policy. *Soc Nat Res* 18:493-509.
- Jackson JBC (2007) Economic incentives, social norms, and the crisis of fisheries. *Ecol Res* 22:16-18.
- Jentoft, S., McCay, B. and Wilson, D. C. (1998) 'Social theory and fisheries co-management', *Marine Policy*, 22, (4-5), pp. 423-436.
- Jentoft, S., van Son, C. T. and Bjorkan, M. (2007) 'Marine Protected Areas: A Governance System Analysis', *Human Ecology*, 35, pp. 611-622.
- Lansing, D. (2009) 'The Spaces of Social Capital: Livelihood Geographies and Marine Conservation in the Cayos Cochinos Marine Protected Area, Honduras', *Journal of Latin American Geography*, 8, (1), pp. 29-54.
- Levin SA (1999) *Fragile dominion: complexity and the commons*. Perseus Books, Reading.
- Levin SA (1998) Ecosystems and the Biosphere as Complex Adaptive Systems. *Ecosys* 1(5):431-436.
- Levin SA (2006) Learning to live in a global commons: socio-economic challenges for a sustainable environment. *Ecol Res* 21:328-333.
- Mascia, M. B. (2003) 'The Human Dimension of Coral Reef Marine Protected Areas: Recent Social Science Research and its Policy Implications', *Conservation Biology*, 17, (2), pp. 630-632.
- McCay, B. and Jentoft, S. (eds.) (2003) *The fisheries co-management experience: accomplishments, challenges and prospects*. Dordrecht: Kluwer Academic Publishers.
- McField M, Bood N, Fonseca A, Arrivillaga A, Rinos AF, Viruel RML (2008) Status of the Mesoamerican Barrier Reef after the 2005 coral bleaching event. In 'Status of Caribbean Coral Reefs after bleaching and hurricanes in 2005'. Global Coral Reef Monitoring Network (GCRMN).
- McPherson M (2006) *Livelihood Transitions: Towards Sustainable Fishing Communities in the Mesoamerican Reef Region, a report to The Nature Conservancy Meso-American Reef Program*.
- Mesoamerican Barrier Reef System (MBRS) (2004, 2006) MBRS News. <http://www.mbrs.org.bz/english/news>
- Montgomery CE, Reed N, Shaw HJ, Boback SM, Walker JM (2007) Distribution, habitat, size and color pattern of *Cnemidophorus lemniscatus* (Sauria: Teiidae) on Cayo Cochino Pequeno, Honduras. *The Southwestern Naturalist* 51(1): 38-45
- Ostrom E (2003) How types of goods and property rights jointly affect collective action. *J Theo Pol* 15(3):239-270.
- Palacio J (2000) A Reconsideration of the Native American and African Roots of Garifuna Identity. Professional Agricultural Workers Conference (PAWC), 58<sup>th</sup> session, Tuskegee University. Available from: <http://www.kacike.org/cac-ike/palacio.html>.
- Perez, A. (2009) 'Fisheries management at the tri-national border between Belize, Guatemala and Honduras', *Marine Policy*, 33, (2), pp. 195-200.
- Pollnac RB, Crawford BR (2000) *Assessing Behavioural Aspects of Coastal Resource Use*. Proyek Pesisir Publications Special Report. Coastal Resources Centre Coastal Management Report # 2226. Coastal Resources Centre, University of Rhode Island, Narragansett, Rhode Island. 139pp.
- Pomeroy RS, Parks JE, Watson LM (2004) *How is your MPA doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness*. IUCN, Gland, Switzerland and Cambridge, UK. xvi + 216pp.
- Portes, A. (1998) 'Social Capital: Its Origins and Applications in Modern Sociology', *Annual Review of Sociology*, 24, (1), pp. 1-24.
- Pretty, J. and Smith, D. (2004) 'Social Capital in Biodiversity Conservation and Management', *Conservation Biology*, 18, (3), pp. 631-638.
- Renard Y, Brown N, Geoghegan T (2001) *Stakeholder approaches to Natural Resource Management in the Caribbean*.
- Roseta-Palma, C., Ferreira-Lopes, A. and Sequeira, T. N. 'Externalities in an endogenous growth model with social and natural capital', *Ecological Economics*, In Press, Corrected Proof.
- Rudd, M. A., Tupper, M. H., Folmer, H. and van Kooten, G. C. (2003) 'Policy analysis for tropical marine reserves: challenges and directions', *Fish and Fisheries*, 4, pp. 65-85.

- Schuttenburg H, Marshall P (2008) Managing for mass coral bleaching: strategies for supporting socio-ecological resilience. In 'Status of Caribbean Coral Reefs after bleaching and hurricanes in 2005'. Global Coral Reef Monitoring Network (GCRMN).
- Shrives J, Cowie G (2007) Marine geochemistry of the CCMPA, Operation Wallacea.
- Van Vliet M, Dubbink W (1999) 'Evaluating governance; state, market and participation compared' in Kooiman J, Van Vliet M and Jentoft S (eds) Creative Governance: Opportunities for Fisheries in Europe. Aldershot, Ashgate.
- Woolcock, M. and Narayan, D. (2000) 'Social Capital: Implications for Development Theory, Research, and Policy', *World Bank Res Obs*, 15, (2), pp. 225-249.
- Yandle T (2003) The challenge of building successful stakeholder groups: New Zealand's experience in developing a co-management regime. *Mar Pol* 27(2):179-192.

## 9. APPENDICES

### 9.1: Appendix A: Household Survey 2009

#### SECTION 1: HOUSEHOLD DEMOGRAPHICS

1. Name?

2. Were you born here in the community? 3. If no, where? 4. How long lived in community? 5.

Why did you move to this community? (2007)

2, 3	a. Community	b. Region	c. Country	d. Other
4	a. <3 years	b. 4-10 years	c. 11-20 years	d. 20+ years
5	a. Work (specify) More ops here?	b. Family	c. Health	d. Other

6. Do you live here all year round? 7. If no, where else do you live? 8. If no, what is the reason you spend time elsewhere?

26. Yes/No	27. Where else live?	28. Reason?

29. How many people live in your house? (2006, 2007)

a. Adult male	b. Adult female	c. Child male	d. Child female

30. Household items and facilities (2007, 2008)

a. Generator	b. Electricity	c. Modern stove	d. Television
e. Fan	f. Satellite	g. Piped water	h. Fridge
i. Radio/stereo	j. VCR	k. Water tank	l. Mobile phone
m. Cayuco	n. Cayuco motor	o. Bike	p. Vehicle other

31. Household materials: a. roof. B. floor. C. walls. D. toilet (2007, 2008)

a.i. thatch	a.ii. metal	a.iii. tiles	a.iv. wood	a.v. other
b.i. cement	b.ii. tile	b.iii. wood	b.iv. dirt	b.v. other
c.i. cement	c.ii. coral	c.iii. wood	c.iv. metal	c.v. other
d.i. flush	d.ii. outhouse	d.iii. public	d.iv. none	d.v. other

32. What close family and friends in the community? 13. Relationship? 14. Where do they live?

Relationship	33. Where live (neighbourhood)

13. What close family and friends outside this community? a. Relationship? b. Where do they live?

a. Relationship	b. Where live (neighbourhood)

34. Do you own or rent your home?

a. Own	b. Rent

35. Is it a private or community decision where you can build a house?

a. Private	b. community

36. If community, how are decisions made by the community for the location of a house?

37. Does the community hold the title deeds for communal land?

a. Yes	b. No

38. Do you think there are many people moving out of this community to other places? (age range, skills) Where to?

a. Proportion out	b. Where to

39. Do you think there are many people moving into this community from other places? (age range, skills) Where from?

a. Proportion in	b. Where from

20a. What positive impacts does migration have on the community?

20b. What negative impacts does migration have on the community?

**SECTION 1A: OCCUPATIONS** – if there is a fisher in the household, ask for the name and arrange a time for me to conduct my fishers interviews. Mark the house down on the map!

25. What are the occupations of everyone in this household? B. Who? C. % income for the household? d. Rank in order of economic importance for household. e. Rank in order of importance for culture. f. In which months is this job done? (2007)

a. Jobs	b. Who	c. % income	d. Rank econ	e. Rank cult	f. Months

Do not ask these next 2 questions

40. Total number of occupations in household (2 teachers = 2 occupations)

41. Total number of different occupations (2 teachers = 1 type of occupation)

42. Do any of these jobs need specific skills training? b. Where did you learn the skills?

a. Job for training	b. Where/how learn skills

43. a. Do you work with anyone else to perform any of these jobs? b. Who? c. How? d. How often?

a. Yes/no	b. Who	c. How	d. How often

44. A. What different work have you done to your current job? B. % income for the household. C. could you do the same work now? D. preference to current job? (2007)

a. Job	b. % income	c. Same now	d. Preference

--	--	--	--

45. How many fishers are there in this community? Individuals and cooperatives?

46. What jobs do men and women do in this community? (2007)

a. Men	b. Women
--------	----------

47. What job/jobs do you think will be available to your children in 10 years time?

48. What do you spend on average per month on the following (lempira): (2007)

a. Food	
b. Fuel	
c. Transport	
d. Gear/tools	
e. Clothes	
f. Rent	
g. Mortgage	
h. Bills	
i. Healthcare	
j. education	
k. alcohol	
l. tobacco	
m. gambling	

49. What foods do you eat ? are they bought locally, bought from town or grown? (2007) which fish species?

Food	Bought locally	Bought from town	Grown
------	----------------	------------------	-------

50. Has the cost of living changed over the last 5 years? Why?

a. Increased	b. Decreased	c. Same

Why:

51. A. Do you receive any remittances/money from anyone? B. who from? C. how much? D. where from? % household income?

a. Who from	d. How much	e. Where from	f. % income

--	--	--	--

52. Have remittances become more important to you over the last 5 years? Why?

53. Has your overall income changed over last 5 years?

a. Increased	b. Decreased	c. Same

54. Are there any other ways that people can make extra money?

**SECTION 2: NATURAL RESOURCES**

55. Which marine and terrestrial resources have been traditionally used by people in this community? What have they been used for?

56. Which resources are more important to people in this community – marine or terrestrial? Why?

a. Marine	b. Terrestrial
Why	Why

57. How are these resource managed within the community? Who makes the rules?

58. A. Would the environment be something you would discuss with other people? B. who?

a. Yes/no	b. Who

59. If there was a meeting held in the community about terrestrial resources, who would you expect to attend? (2007)

60. Are you happy with this representation (whoever is mentioned in question 45) on behalf of the community? (2007) if Patronato is not mentioned, ask if happy with the Patronato

c. Yes	a. No	a. Don't know

Why?

61. Do you think the environment in this community is:

a. Very bad	b. Bad	c. Neither	d. Good	e. Very good

62. Has the availability of a. reef fish and b. shellfish changed in the last 5 years? (2007)

a.i. Increased	a.ii. Decreased	a.iii. Same	a.iv. Don't know
b.i. Increased	b.ii. Decreased	b.iii. Same	b.iv. Don't know

63. Has there been a change in the cost of reef fish and shellfish changed in the last 5 years? (2007) Why?

a.i. Increased	a.ii. Decreased	a.iii. Same	a.iv. Don't know
b.i. Increased	b.ii. Decreased	b.iii. Same	b.iv. Don't know

64. Where do you learn about the environment? (2007, 2008)

f. Family	g. School	h. HCRF	i. NGO	j. Other

65. Which type of environment do you find most interesting to learn about? (2008) Why?

a. Marine flora	b. Marine fauna	c. Terrestrial flora	d. Terrestrial fauna

Why?

66. Can you tell me what you know about the management of the Cayos Cochinos MPA?

67. Do any of these rules affect you? How?

68. Are you aware of the new management plan for the CCMPA introduced last year? (2008)

a. Yes	b. No

69. If yes, has this new plan been better or worse for you? Why?

70. Do you think the Cayos Cochinos are well managed by a. HCRF, b. community? (2006)

a. Yes	a. Yes
a. No	b. No

71. Do you think the MPA has affected the community on the following factors:

a. Environmentally	b. Economically	c. Socially	d. Culturally
+	+	+	+
-	-	-	-
DK	DK	DK	DK
Why?			

72. Does anyone in this community work with OFRANEH or ODECO?

73. What issues do you work on with each organisation?

74. Why do you choose to work with this organisation?

SECTION 3: SOCIAL CAPITAL

75. What groups are there in the community? (2007) Are you a member? % of community that are members? How important to the community for information?

a. What	b. You member	c. % of community members	d. Rank importance for community

76. A. Do any of the groups listed have connections outside of this community? B. How/what? C. How often interact?

a. Group	b. How/what	c. How often

77. A. Have there been any big disputes within the community? B. who with? C. how resolved?

d. What?	e. Who with	f. How resolved

78. Who decides what can and cannot be done in the community (local laws)? (2007) Who is the Patronato?

79. Are these decisions made with the whole community? (2007)

80. Do you attend community meetings?

a. Always	b. Sometimes	c. Never

81. How do you become aware of these decisions? (2007) e.g., meetings, friends, groups?

82. Who would you tell if you thought someone was breaking a community law?

83. Do you think that most people in this community can be trusted? Why?

d. Yes	e. No

Why?

84. Do you think people in this community work better as individuals or as a community? Why?

f. Individual	g. Community

Why?

85. Are there any cooperatives currently in the community? How long have they existed?

86. Who is involved?

87. What are the obstacles/problems for working together in a cooperative in this community?

88. What do you think is necessary to make a cooperative function better?

89. What are the issues being talked about most in the community at the moment? (critical discourse analysis)

90. What sources of information do you have to find out about national issues?

a. Patronato	b. Group	c. Newspaper	d. Radio	e. Other

91. What sources of information do you have to find out about local issues?

a. Patronato	b. Group	c. Newspaper	d. Radio	e. Other

92. What sources of information do you have to find out about the environment?

a. Patronato	b. Group	c. Newspaper	d. Radio	e. Other

93. What sources of information do you have to find out about jobs?

a. Patronato	b. Group	c. Newspaper	d. Radio	e. Other

#### SECTION 4: COLLECTIVE ACTION

94. A. What events are there in the community that everyone would attend? B. When are they held?

f. Event	g. When

95. If there was a problem in the community, e.g., loss of drinkable water, would the community work together to sort it out?

a. Yes	b. No

#### SECTION 6: TOURISM

96. Have you heard of the following terms? If yes, from whom? What words come to mind when you hear this term?

Term	Heard from whom	Associated words
a. Over-fishing		
b. Conservation		
c. Pollution		
d. Climate change		
e. Ecotourism		
f. Sustainable development		
g. Co-operative		

97. A. What activities/products are currently being used for tourism in this community? B. who is involved both within and outside the community?

a. Activity	b. Product	c. Who

98. Are any of these products currently being sold outside of this community? Where?

99. How do tourists find out information about this community and its activities/products?

100. How many local people are working in any of these tourist activities at the moment?

101. What other activities/products could be used for tourism additional to these? Who would be involved both within and outside the community?

a. Activity	b. Product	c. Who

102. What types of training would you consider necessary for each of these activities? Provided by whom?

a. Activity	b. Training needs	c. whom

103. What is the current level of tourism in this community? (2007, 2008)

a. none	b. very little	c. some	d. lots	e. don't know

104. What % of the community currently benefits from tourism? (2007, 2008)

a. 0-20%	b. 20-40%	c. 40-60%	d. 60-80%	e. 80-100%

105. Who are the people that benefit? Position in the community? (2008) i.e., Patronato, fisher

106. Could you please indicate how each of the following factors of community life has been affected by tourism? (2007)

Factor	Very bad	Bad	Neither	Good	Very good
a. Traditions					
b. Economy					
c. Environment					
d. Language					
e. employment					
f. quality of life					
g. services					

**FUTURE SCENARIO SETTING**

107. If you could do any job, what would your ideal job be? Why?

108. Do you think it's possible to do this job in this community? Why?

109. What job would you never like to do? Why?

110. What would you like to see happen in the community in the next 5 years?

**BASIC DEMOGRAPHIC INFORMATION**

Age	
Gender	
Religion	
Languages spoken	
Number of years at school	
Ethnicity	

