Contested models of marine protected area (MPA) governance: A Case Study of the Cayos Cochinos, Honduras

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ABSTRACT

Co-management arrangements are increasingly seen as necessary to promote the compliance of local user groups with natural resource conservation regulations. Nonetheless, co-management needs to be flexible to respond to fast-changing variables at the local scale, and adaptive co-management (ACM) has been developed to provide that flexibility. Since 2004, ACM has been applied to manage the natural marine resources of the Cayos Cochinos Marine Protected Area (CCMPA) on the north coast of Honduras, and has now evolved through two cycles (2004-2008; 2008-2013).

This thesis examines the appropriateness of ACM to manage the artisanal fishery resources of the CCMPA, using socio-economic, ecological and governance indicators to evaluate the contributions made by local Garifuna fishing communities (micro-scale), the managing NGO (meso-scale), and the State (macro-scale). To achieve this aim, three main objectives were set: first, to evaluate the ecological impact of the ACM, particularly its effect on fish stocks; second, to measure the socio-economic consequences of the ACM; and third, to estimate the extent to which the principles of adaptive co-management were adhered to. The main conclusion of the study was that the first CCMPA management plan (2004-2008) failed to deliver significant benefits on any of these three criteria, but that the second plan (2008-2013) has already begun to achieve ecological recovery of shellfish species, higher standards of living, and consultative stakeholder participation. The reason for this turnaround was political pressure from the Garifuna in protest at the filming of a controversial reality show within the CCMPA, leading to a more socially adaptive plan. However, this second plan continues to have some weaknesses, including incomplete ecological monitoring, financial and personnel instability, lack of transparency, and insufficient capacity development to allow genuine stakeholder participation. Recommendations for overcoming these deficiencies are: (1) consistent methodologies for monitoring ecological, socio-economic and governance indicators; (2) financial and decision-making transparency; (3) community education; and (4) micro-scale capacity training.

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LIST OF ACRONYMS

ACM	Adaptive co-management
AGRRA	Atlantic Gulf Rural Rapid Appraisal
AM	Adaptive management
ANOVA	Analysis of variance
AVINA	Latin America Development Agency
C.U.R.L.A.	Centro Universitario Regional del Litoral Atlantico / Altantic Regional Branch of the National University La Ceiba
CAS	Complex adaptive systems
CASE	Non-academic Institute partner
CCMPA	Cayos Cochinos marine protected area
CLIME	Caribbean Large Marine Ecosystem
CM	Co-management
CNN	Cable News Network
COHDEFOR	Cooporacion Hondurena de Desarrollo Forestal/Honduras Forest Development Corporation
CONAP	National Council of Protected Areas
CPR	Common property regime
CPUE	Catch-per-unit-effort
DAVPS	Department of Protected Areas and Wildlife
DIGEPESCA	Secretaria de Agricultura y Ganaderia/Directorate General for Fisheries and Agriculture
EBA	Ecosystem-based Approach
EBA	Ecosystem-based approach
EEZ	Exclusive economic zone
EIA	Environmental Impact Assessment
ESRC	Economic and Social Research Council
FAO	Food and Agriculture Organisation
FUCSA	Cuero y Salado Foundation (wetlands reserve)
GAD	Grupo de Apoyo al Desarrollar

GEF	Global Environment Fund
GFA	Global Fish Alliance
GPS	Geography, Politics and Sociology (Newcastle University)
HCRF	Honduran Coral Reef Foundation
IACHR	Inter-American Court for Human Rights
IADB	Inter-American Development Bank
ICF	Instituto nacional de conservacion y desarrollo forestall/National Institute of Forestry conservation and development.
ICRAN	International Coral Reef Action Network
IHT	Honduran Institute of Tourism
IUCN	International Union for Conservation of Nature
KI	Key informant
LEK	Local Ecological Knowledge
MBRS	Meso American Barrier Reef System
MBRS-MAR	Mesoamerican Barrier Reef System – Mesoamerican Reef Program
MODAPESCA	Artisanal fisheries development project – Department of Atlantida
MPA	Marine protected area
NGO	Non-governmental organisation
NTZ	No-take zone
NVivo	Qualitative data analysis software
OA	Open Access
OCECO	Organisation for Ethic and Community Development
OFRANEH	Organizacion Fraternal Negra Hondurena/Fraternal Black Honduran
REF	Research Ethics Framework
REHDES	Honduran Ecologist Network for Sustainable Development
SAS	Spawning Aggregation Site
SCALE	Sustainable fisheries and aquaculture approach (GFA)
SCUBA	Self-Contained Underwater Breathing Apparatus
SER	Social ecological resilience

SERNA	Secretaría de Estado en los Despachos de Recursos Naturales y Ambiente/Secretary of State for Natural Resources and Environment
SES	Social Ecological systems
SETUR	National Sustainable Tourism Program
SIEC	Society for Ecological Investments
SPAW	Specially Protected Areas and Wildlife
STRI	Smithsonian Tropical Research Institute
TNC	The Nature Conservancy
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US AID	United States Agency for International Development
USP	Unique Selling Point
WCED	World Commission on Environment and Development
WCP	Wildlife Conservation Product
WWF	World Wildlife Fund

CHAPTER 1: INTRODUCTION

1.1 Introduction

Participatory governance structures (integrated administration between the State and civil society actors) are favoured in locations where coastal livelihoods were dependent on natural resources to rectify the socio-economic problems (loss of income) caused by centralised designation of marine protected areas (MPAs) in developing countries. Co-management (CM) arrangements have been the most favoured governance structures, promoted through decentralisation for natural resource management. Co-management arrangements have achieved political success by including local stakeholders in the decision-making process, yet they have demonstrated limited capacity to adapt to changes in the social-ecological system being governed (Carlsson and Berkes, 2005). Adaptive Management (AM) regimes have emerged as a mechanism to remedy this deficiency because they recognise the inherent uncertainty within complex systems, such as, fisheries, and emphasise learning-by-doing as an essential requirement to respond to changing conditions (Armitage, 2005). However, adaptive management has been difficult to implement because many institutional arrangements do not have sufficient adaptive capacity (Armitage *et al*, 2008).

As a means of utilising the best aspects from each of these management arrangements (CM and AM), a hybrid form of participatory governance, adaptive co-management (ACM) has been developed to address participation and uncertainty. ACM relies on the social and institutional learning necessary to promote shared understanding of ecosystem and natural resource problems (AM) which can only be truly generated through meaningful interactions between stakeholders at all levels (CM). Inherent in ACM is the understanding that both the governing system and the community being governed will respond to new information to adapt its behaviours by challenging previously held assumptions. Through this adaptation, it can be hypothesised that multiple actions (policies) may generate multiple outcomes without altering the overall equilibrium state of the resource system (Armitage, 2005). Therefore, learning is achieved through experience of different policies delivered by effective feedback from both the social and ecological components of the system.

The focus of this thesis is to investigate whether the conditions identified by Armitage *et al* (2008) for successful ACM are available in the Cayos Cochinos Marine Protected Area (CCMPA), or if an alternative governance approach would be more effective. In order to review these circumstances, both the process of management and subsequent

changes/outcomes have been analysed to examine the adaptive capacity of the hybrid governance framework for the CCMPA. By examining the management models for the CCMPA over two management cycles (2004-2008; 2008-2013) this thesis will examine whether the two management models used to manage the natural and fisheries resources of the CCMPA effectively achieved their ecological, socio-economic and governance objectives. In particular, this thesis investigates whether the first co-management arrangement between the decentralised State (Municipality of Roatan) and the managing NGO (HCRF) provided the necessary conditions to enable successful application of the second adaptive co-management arrangement, which was more inclusive of devolved government agencies (COHDEFOR, SERNA, DIGEPESCA) and the Municipality and HCRF. Without successful co-management (CM) in the first management cycle, it is hypothesised that adaptive co-management (ACM) would not be able to function effectively.

This hypothesis generated four main research questions which I shall address in this thesis:

1. Has the sustainability of natural resources been enhanced by co-management and /or adaptive co-management?
2. Has the sustainability of local community livelihoods been enhanced by co-management and/or adaptive co-management?
3. Has the flexibility and adaptive capacity of governance been enhanced by co-management and/or adaptive co-management?
4. Overall, is the CCMPA first model (CM) and/or second model (ACM) an effective mechanism for fisheries management, or is there a more appropriate management regime for the CCMPA?

This examination of the process of changing from a CM to an ACM arrangement provides an original contribution to current research knowledge and informs an advanced understanding the specific conditions under which ACM is most likely to proceed.

The remainder of this chapter will present the rationale of the thesis by introducing the topics that lie at the heart of this study, including the basis of natural resource management in Honduras; small-scale coastal fisheries management; failures of conventional fisheries management; the emergence of the ecosystem-based approach to management; the use of marine protected areas for natural resources and fisheries management; decentralisation of governance for co-management arrangements; the complementary use of adaptive management with co-management; and the subsequent development of adaptive co-

management. I will then place these theories within the context of the Caribbean and Honduras, and finally present the Cayos Cochinos marine protected area case study in detail.

1.2 The Rationale of the Thesis

1.2.1 Honduran natural resource management

Honduras is a country with a tumultuous past. As a former Spanish territory, the country gained independence in 1821 but has suffered from political corruption and instability ever since. In 1963, a military coup was mounted against a democratically elected President, Ramon Morales, leading the country into two decades of military government. Previous military coups had claimed much of the country's resources that could have been used for development, and ended any reformist liberal government efforts to promote economic growth and reform agrarian land distribution. During these periods of military rule, government funds, foreign investment and aid monies were siphoned into business to accumulate private fortunes. This exacerbated the great divide between rich and poor, allowing only the small elite of business leaders, military officers and bureaucrats to benefit from the Honduran economy (Contreras-Hermosilla, 2003). Lack of economic growth, macro-economic imbalances and a skewed distribution of wealth all hindered successive administrations' ability to overcome inherited internal troubles, and increased vulnerability to external economic and climatic events.

During the 1970s a reformist military government under the control of General Oswaldo Lopez Arellano inaugurated a National Plan for Development. The plan mainly focused on agrarian land reform which encouraged small-scale producers to form cooperatives, and foreign aid was utilised to create autonomous, state-owned enterprises. One of these enterprises, the Honduran Corporation for Forest Development (COHDEFOR), took over sole management of nationalised forests, subsequently becoming responsible for all natural resources: terrestrial, freshwater and marine. However, despite this recognition of the commodity value of Honduras' natural assets, the weak governance structure of national government permeated all state-centred enterprises, and resulted in a legacy of stakeholder disputes, unrealistic development strategies and a climate of mistrust among local users.

In 1974 the impact of Hurricane Fifi, which caused severe damage to infrastructure and agricultural produce throughout Honduras, generated a movement for social and economic reform to tackle the resultant recession. Democracy was restored in 1982 when President Roberto Suazo Cordova was elected, bringing the Liberal Party of Honduras into power,

which enabled the USA to influence Honduran policy through a strong bilateral relationship. Indeed, Honduras became the lynchpin for US policy in Central America, and in return many Honduran nationals were granted official visas to reside in the US (Meyer and Sullivan, 2009). Honduras was also granted access to substantial foreign aid to stimulate macro-economic development and improve social welfare. However, after a decade of continual corruption and poor fiscal performance, donor agencies (in particular the World Bank) called for political reform. As a result, in 1992 a National Anti-Corruption Strategy was introduced which implemented neoliberal reforms (market incentives and efficiency) to governance, including a fiscal stimulus in response to the external debt crisis, and a policy of streamlining its administrative, policy and legal frameworks in an effort to introduce transparency of its actions (Kaufmann, Kraay and Mastmizzi, 2006). Like many Latin American countries, the Honduran government was expected to improve performance against corruption indicators by complying with this model of 'good governance' (World Bank, 2006; UNDP, 2002). This was defined as behaviour that would encourage consultation and participation to foster a better democratic system of governance and improve the relationship between the State and civil society (World Bank, 1999), through several key attributes: democracy, transparency, legitimacy, accountability and subsidiarity.

The key to good governance was the last attribute – subsidiarity – which entailed decentralisation of decision-making to the lowest state authority to shorten the divide between policy decision-making and civil society by sharing responsibilities. Decentralisation became an important tool not only for macro-economic development, but also critically for natural resource management (Agrawal and Gupta, 2005), and led to increased interaction between actors at all levels and with non-state actors, which has allowed private institutions (NGOs, business, markets) to play a much greater informal role in natural resource management than the State. Yet ideally it was seen that good governance should be neither an abdication of power from the State nor the shifting of burdensome administrative tasks to other institutions; it should be a purposeful arrangement to draw on the opinions, skills, knowledge and experience of different actors in a genuine partnership (Symes, 2006).

In natural resource management in Honduras, a hybrid governance model (Figure 1.1) has been developed that should promote the above attributes of good governance by using a broader set of actors, permitting strong participation by local resource users and including non-state actors (NGOs) in the decision-making process. For small-scale resource use, i.e., fisheries management, such models of hybrid governance should generate socially acceptable

policies at the local level which emphasise democracy and equity (Brondo and Bown, *in press*). However, in practice, as Rojas (1999) has shown, many decentralisation processes for natural resource management in Latin American countries (including Honduras) have been disorganised and problematic under neoliberal regimes. The regulatory and enforcement

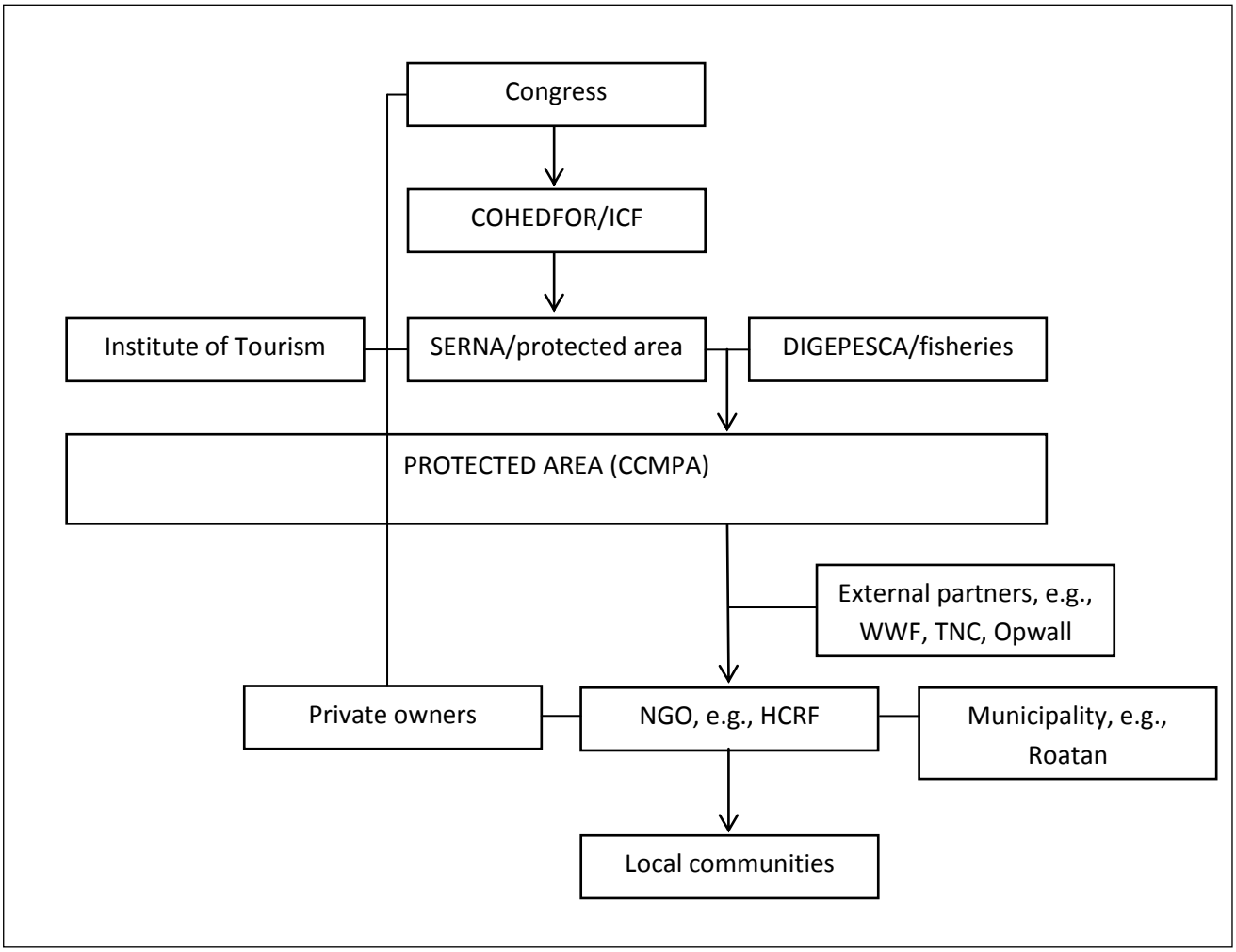

Figure 1.1. A representation of the hybrid governance arrangement for natural resource management for the CCMPA in Honduras. The diagram illustrates the direction of the flow of information and the relative power exerted by each organisation/group in the decision-making process. (Source: author's own).

mechanisms needed to administer participatory processes were insufficiently developed to manage the complexities of such location-specific regimes. Nevertheless, in spite of this lack of administrative capacity, multi-lateral donor organisations working alongside State agencies have been keen to promote co-management arrangements (Kellert *et al*, 2000) regarding conservation and sustainable use of fisheries resources. The reality for Honduras was that COHDEFOR did not have sufficient personnel or resources to successfully manage the enlarged responsibility, therefore private enterprises and NGOs were given accountability of management for specific protected areas under the guise of decentralisation. Often as a result,

MPAs have been implemented as the primary conservation tool yet have inadequately achieved either conservation or participation objectives.

Critically for natural resource management in Honduras, neoliberal reform strategies included the designation of protected areas which would utilise the wealth of national natural assets for tourism-based economic development. Within the discourse of political ecology, protected areas became an example of 'ecology without politics' (Vayda and Walter, 1999) because they prioritised conservation objectives without consideration of the impacts on local communities. Complex socio-environmental dynamics, that for decades had sustained dependent communities through livelihood sustainability and micro economics, were disregarded, along with established social norms and behaviours that had ensured livelihood and ecosystem sustainability (Ostrom, 1990). The protected areas paradigm infiltrated natural resource management policies in the early 1990s through neoliberal reform strategies to utilise the extensive natural sources available for tourism-based economic development. Moreover, when protected areas emerged under neoliberal reform strategies, often funded by the FAO or UNEP, they followed a top-down model of legislation before inter or multi-disciplinary thinking had emerged. Therefore these areas were reserved mainly for tourism whose interests prevailed over those of local people (Phillips, 2003).

To mitigate these effects, central governments promoted various schemes of alternative livelihood options. One such alternative which has been heavily promoted in developing countries is ecotourism. Indeed, ecotourism has now become synonymous with protected areas (West *et al*, 2006) for conservation and sustainable development strategies. The aim of conserving/protecting those resources through ecotourism enterprises was to stimulate the local economy by increased marketization of resources (Buscher and Wandle, 2007). However, ecotourism has had mixed success, and has been criticised for commodifying nature (changing human-nature interactions) and for creating new forms of inequality. Igoe and Brockington (2007) charge ecotourism with nature commodification, by assigning to natural resources new values which are incongruent with traditional values, transforming the relationship between local people and their traditional use of resources, and often devaluing local traditional knowledge in favour of macro-economic ideals. Brondo and Bown (*in press*) show how inequalities can arise out of the misdistribution of benefits from the exploitation of natural resources as a result of the different roles played by community members in ecotourism activities. Such activities can marginalise some local residents from the mainstream political realm of natural resource management, whilst allowing profit-oriented

stakeholders to participate through tourism development. In this way, protected areas that have limited traditional activities and promote ecotourism-based alternatives risk creating a stratification of wealth and power within local communities (Brondo and Bown, *in press*). This may be the price that has to be paid for using conservation as a mechanism for private enterprise and foreign investment, i.e., 'ecology for politics'.

Protected areas and associated eco or 'nature' tourism became a central component of the long-term economic development strategy in Honduras. To encourage international investment in tourism development, the government established a set of laws creating 'tourism zones' through taxation and import incentives in the 1980s. Historically, Article 107 of the Honduran Constitution had prohibited foreign ownership of land up to 40km from the Caribbean Sea. In 1993 the National Congress recognised this substantial barrier to investment and passed a law (Decree Law 90/90) to overturn Article 107, allowing foreigners to own property within these tourism zones. At the same time a Ministry of Tourism was established to regulate investment which was focused primarily along the northern coast and in the Bay Islands. Also in 1993, 23 protected areas were designated (this has since risen to 102, see Table 1.1) including terrestrial, coastal, wetlands and marine environments (COHDEFOR, 2007).

To administrate these areas, SERNA (Secretary of State for Natural Resources and Environment) was also created (in 1996) as a sub-division of COHDEFOR under the General Law for Public Administration. SERNA was given legislative power to designate new protected areas as well as coordinate the evaluative procedures for monitoring managerial performance. Following national neoliberal reforms, SERNA was decentralised with an office in each Municipality, and received all funding from local government to implement municipal-level environmental legislation. However, the ability of each regional office to perform its legislative functions was dependent on the funding it received from the Municipality. Although not part of the tourism zones, foreign investment was permitted within regional protected areas by SERNA. Furthermore in the same year, the Honduran Institute of Tourism (IHT) was created to promote tourism as the basis of a macro-economic reform strategy which centred on the newly designated national parks and protected areas, reportedly generating US$ 90 million through foreign investment within two years (Higham, 2007). However, despite the close mutually dependent existence between protected areas and tourism, the IHT and SERNA did not coordinate policy development or decision-making. The IHT focused on economic development strategies, whilst SERNA focused on natural

resource management. This culture of independent decision-making was exacerbated by the decentralisation of management responsibilities from the State to local NGOs and Municipalities (local government), which will be discussed in section 1.2.3.

According to the Ministry of Tourism, all tourism activities were to comply with the principles of sustainable development, having a minimal impact on the cultural and natural resources of Honduras whilst benefitting the national population (Stonich, 2000). But in practice, tourist's rights to use natural resources were promoted over the traditional user

Table 1.1: Number of protected areas in Honduras including all terrestrial and marine sites under nationally recognised categories - both legally established and proposed sites. (Source: DAVPS website and Key Informant interview, 2007).

CATEGORY	NUMBER OF AREAS
Anthropological reserve	1
Biological reserve	24
Botanical garden	1
Cultural monument	3
Ecological reserve zone	1
Forest reserve	2
Forest and Anthropological reserve	1
Man and Biosphere reserve	1
Marine national park	4
Marine reserve	8
Multiple use area	5
Municipal reserve	2
National park	21
Natural monument	6
National monument	1
Nature reserve	1
Species habitat protection area	7
Wildlife refuge	13
TOTAL	102

rights of *de facto* inhabitants of coastal lands (Contreras-Hermosilla, 2001), essentially creating a 'conservation for tourism' national policy as the basis for localised management

decisions (Brondo and Bown, *in press*). Furthermore, disputes about formal rights of ownership over coastal land for many communities were often decided in favour of foreign investors.

Nevertheless, despite these potential problems created by decentralisation and hybrid governance models for protected areas, Honduras is now considered by The Nature Conservancy (TNC)[1], to be a leader in the field of natural resource management and conservation in Central America having made the CCMPA one of four platform (exemplary) sites within the MBRS region. In one protected area, the Rio Platano Biosphere (terrestrial) reserve, this claim would appear to be justified. This reserve, which covers an area of 500,000 hectares, has been protected in Honduras since 1980 when the importance of the area's extensive biodiversity was recognised for its intrinsic (ecological) and extrinsic (tourism) value, and in 1983 it was awarded UNESCO status as a World Heritage site. In this enormous reserve, it is estimated that only 2000 indigenous people are living within its boundaries (UNESCO webpage), and successful alternative livelihoods have been developed in their communities based on nature tourism, perfectly following the protected areas paradigm discussed above. By contrast, the Cayos Cochinos marine protected area (CCMPA) covers only 489.25 km^2 (equivalent to 50,000 hectares, or one tenth the size of Rio Platano) but has an estimated 7500 people[2] living either inside the reserve or within its sphere of influence, almost four times the population dependent on the Rio Platano reserve. Although ecotourism has been promoted as an alternative livelihood to traditional activities in CCMPA, the question arises as to whether there is sufficient capacity within the CCMPA to support a much larger dependent population.

This thesis analyses the complex management and governance arrangement of the Cayos Cochinos. The socio-economic, ecological and governance effects of this focus will be discussed in Chapters 3, 4 and 5.

1.2.2 Small-scale coastal fisheries management

Conventional fisheries management using the scientific method to provide predictive advice by means of modelling population biology for single-species has long been recognised for its failure to successfully manage fish stocks because it does not account for social-ecological

[1] The TNC are a global conservation organisation working to protect ecologically important land and sea areas for nature and sustainable human use. TNC are the lead organisation of the MBRS-MAR program working with Belize, Guatemala, Honduras and Mexico to promote ecological connectivity in the southern MBRS region.
[2] Figure generated through empirical research by author.

interactions (Holling and Meffe, 1996; Berkes and Folke, 1998; Grafton *et al*, 2006; Gray, 2005). It has only more recently been recognised that this failure was also caused by its top-down, centralised governance structure for decision-making by the experts (Charles, 2000; Gray, 2005; Daw and Gray, 2005; Acheson, 2006). Even though the need for an ecosystem-based approach (EBA)[3] for resource management was recognised in the 1990s to account for multi-species interactions, the recognition of the role of humans within that ecosystem was slow to be reached and even slower to be translated into governance approaches for fisheries management.

Following the increasing level of fisher dissatisfaction with the performance of conventional fisheries management systems for small-scale tropical fisheries, stakeholder participation in decision-making grew in popularity, creating a newly emerged focus on the concept of 'governance' as a substitute for 'government' (Gray, 2005). Fisheries governance can be divided into three main modes of institutional arrangement: 1) centralised hierarchical governance characterised by top-down, command-and-control mechanisms operating at the state level; 2) market-based governance based on the forces of supply and demand operating at the individual/corporate level; or 3) participatory governance allowing stakeholders to be involved in the decision-making process operating at the level of civil society (Van Vliet and Dubbink, 1999 in Gray 2005).

In coral reef regions, fisheries have often followed a market-based mode of governance at industrial level which has resulted in decreasing species abundance and coral sustainability, as resources are increasingly targeted for commercial revenue (Yandle, 2003). Because coral reef-based fisheries remain an integral part of traditional lifestyles for coastal populations, this form of governance has sometimes had a severe impact on the well-being of indigent populations. In recognition of the ecological damage caused by industrial fishing governed through market forces, in many countries marine protected areas (MPAs) have been established, often by top down measures. The IUCN definition of MPAs is 'any area of intertidal or sub-tidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment' (Kelleher, 1999). Within this definition many different types of MPAs exist, including protected areas, marine reserves, marine parks and

[3] An approach to sustainable environmental management that considers the effects of policies and outcomes on all elements of an ecosystem, recognising that all elements are inter-linked.

no-take zones, with widely varying regulations permitting levels of extractive activities within the sites' boundaries.

From a historical perspective, MPAs originated from the protected terrestrial areas paradigm instigated in the USA, which rested on the preservationist ideology that nature and society have a negative relationship. So protected terrestrial areas were established under ecological assumptions that only valued pristine wildernesses for their biodiversity (Kalamandeen and Gillson, 2007). The idea was to preserve areas of 'wilderness' from human habitation or alteration by prohibiting any human activities (Abakerli, 2001). However, when the first MPAs were established in coastal waters they were designed not only to protect and conserve species biodiversity and ecosystem health (Beverton and Holt, 1957), but also to provide a practical means of privatising marine resource for exclusive use by selected local stakeholders. This ambivalence between biodiversity protection as the only goal, and a mixture of biodiversity protection and economic exploitation, has bedevilled the application of the concept of MPAs, especially in developing countries. While these preservation areas were initially designated in developed nations in regions without localised resource use, the application of protected areas in developing countries has created extreme difficulties. In developing tropical countries, MPAs have been an effective instrument for biodiversity conservation, and have been increasingly advocated for fisheries management when integrated into EBA management plans (Alder, 1996; Ward, Heinemann & Evans, 2001; Gell and Roberts, 2002; Mascia, 2003; Hawkins and Robert, 2004). However, the consequence of achieving biological success (increasing species abundance and biodiversity) by adopting an ecological disciplinary perspective (Degnbol *et al*, 2006) has often been a severe negative socio-economic and cultural impact on local communities (Jones, 2001; Sanchirico, 2002; Christie, 2004; Petersen *et al*, 2003a; Cinner and McClanachan, 2006; Fraga and Jesus, 2008), despite the claim that human benefits from MPAs would flow as secondary effects through increased goods and services (Jentoft *et al*, 2007).

This human dimension to natural resource management has now been widely recognised as a major limiting factor to the success of MPAs (Pollnac *et al*, 2001; Mascia, 2003; Cinner, 2005a; Cinner *et al*, 2009; Charles and Wilson, 2009). Where MPAs have been implemented through top-down centralised systems in areas traditionally utilised by small-scale fishing communities, the income generating ability of local users through fishing-based activities has diminished, generating resistance and animosity towards MPAs and enforcers. Without local communities' acceptance and commitment, fisheries management objectives using MPAs as

the principal management tool are often undermined by non-compliance with regulations (McClanahan *et al*, 2005; Oracion *et al*, 2005).

In the Caribbean region, this tension between the ecological aims and the socio-economic consequences of MPAs is particularly acute, because they face the challenge of balancing human use of natural resources with conservation (Salas *et al*, 2007) in a situation where population density is high, exerting considerable pressure on marine resources. In the face of progressive decline of those resources, competition between different users is increasing which threatens the livelihoods of people dependent on those resources in coastal communities (Allison and Ellis, 2001; FAO, 2005). Compounding this problem, as Greboval (2002) notes, are factors of poverty, lack of alternative employment, inappropriate incentives and weak governance.

1.2.3 Failures of conventional fisheries management

Using a biological perspective, Campbell *et al* (2000) succinctly explain that conventional fisheries management failed because it divided marine phenomena into distinct components (disciplines) to identify processes and then developed separate management solutions to address specific research questions. They pointed out that by removing these components from the larger ecosystem context, many management solutions created more problems for other disciplines. In addition to this criticism of fragmentation, the failure of conventional fisheries management is also often attributed to the hierarchical governance framework within which it operates. As discussed by Gray (2005), there are three central foci for this criticism: 1. the State is wrongly assumed to hold a monopoly on all fisheries knowledge, favouring technical knowledge underpinned by the paradigm of economic efficiency (Gibbs, 2008) and ignoring the value of knowledge held by non-technical stakeholders; 2. the State held executive powers of decision-making over natural resource management and excluded local resource users; and 3. the State was unable to prevent individuals or groups from undermining government policies where those policies subjected them to unfavourable conditions without incentives to comply. Consequently, the command-and-control approach to fisheries management resulted in extensive failures to manage stocks sustainably and produced increasing levels of social unrest within civil society (Holling and Meffe, 1996).

Within tropical fisheries in developing countries, the consequences of command-and-control approaches have most severely impacted small-scale coastal fishing communities whose livelihoods are dependent on marine resources. The decline of key commercial species as a

result of unsustainable fisheries policies generated a commercial interest in lower trophic species, particularly in tropical shallow waters (10-100m). Shellfish became a major export product for industrial trawlers whilst other finfish species were discarded as by-catch (Pauly *et al*, 2002). As these by-catch species are often important for consumption and localised sale by small-scale fishers, this placed both coastal fisheries biodiversity and dependent livelihoods at risk from commercial fishing pressure. These threats from overfishing, when combined with natural external disturbances such as hurricanes which occur frequently in tropical ecosystems, reduced the resilience of that ecosystem to resist structural change (Holling, 1994). Structural change analysis indicated that the ecosystem was permanently altered, leading to a loss of biodiversity and the undermining of local cultural traditions associated with a specific ecosystem. Yet as Pauly *et al* (2002) point out, such shallow water exploitation was common in developing countries after the 1982 UN Convention on the Law of the Sea (UNCLOS) ruled that any country that did not fully utilise all of its coastal resources within its exclusive economic zone (EEZ)[4] would have its EEZ made available to fishing fleets of other countries. This ruling encouraged overfishing of continental shelf fisheries by many tropical countries including Honduras, and consequently small-scale fisheries were left marginalised and in relative poverty without any support from the State. The social unrest and political activism resulting from such exclusion led to a demand for the inclusion of local stakeholders in decision-making from the late 1980s.

By the early 1990s, awareness of the need for integrated ecological and social systems management was emerging. A new paradigm for fisheries management arose in the form of the ecosystem-based approach (EBA) which integrated the principles of natural ecology, political ecology, sociology and the study of human behaviours (Berkes, 1989). The EBA recognised the limitations of the previous single-species management approach and incorporated social-ecological interactions as well as fishers' participation into the management system. This integrated approach has been articulated in the FAO's Code of Conduct for Responsible Fisheries (1995) which emphasises the importance of a strong decision-making process, inclusion of user groups and clear rights of access and obligations. The benefit of EBA for the State was politically motivated, recognising the scale of the extended fishing community as a powerful ally. The benefits for fishers included protection of their livelihoods through sustainable resource use, preferential access to resources and more equitable sharing of the benefits derived from fishing resources. A different approach

[4] EEZ extends to 200 nautical miles from coastline.

which provided room for local collaboration and discussion by allowing participation of local stakeholders within decision-making began to emerge. In the case of small-scale artisanal fisheries with generations of employment and food security, it is equally important to implement societal adaptations, including management strategies that acknowledge cultural and political backgrounds (McClanahan and Castilla, 2007). Thus the discourse on 'community participation' began to emerge, fed by the disappointment created by top-down management. Co-management arrangements (defined below) were considered the most effective approach to achieve this participation.

1.2.4 Emergence of co-management (CM)

Co-management arrangements (CM) have generated the most success for conservation strategies through areas which have either been protected - e.g., marine protected areas (MPAs) - or have small-scale resource use providing a manageable jurisdictional area. Managers and scholars recognised that a more participatory approach to decision-making would include a more comprehensive knowledge base, better representation of stakeholder interests and the involvement of civil society (Wilson *et al*, 2003; Symes, 2006). To achieve this co-management was considered the most effective solution. Simply defined, CM arrangements are the sharing of power and responsibility between the State and resource users to make decisions regarding natural resource use (extraction and conservation) (Pomeroy and Williams, 1994; McCay and Acheson, 1987; Pinkerton, 1992; Kaplan and McCay, 2004). Such strategies forge a compromise between the two extremes of the governance spectrum: centralised top-down control and decentralised community-based control of resources (Virdin, 2000). These arrangements have evolved as formalised strategies to secure a greater role for local stakeholders in decision-making and are thought to improve legitimacy and compliance with agreed management decisions (Jentoft, 2000). They serve to democratise decision-making and contribute to conflict resolution through shared understanding of natural resources and management problems (Armitage *et al*, 2008). As a form of participatory governance (Jentoft, 2000; Kooiman, 2003) a shared decision-making process was also thought to benefit from increased transparency and shared administrative and enforcement costs (Pinkerton, 1989).

While there have been many forms of co-management, including participatory natural resource management, participatory appraisal, participatory action research and community-

based natural resource management (Berkes, 2002), McConney *et al* (2007) outline three main types of co-management:

1. Consultative co-management where the State retains the majority of control over natural resources and community user groups tend not to be involved during the decision-making stages.

2. Collaborative co-management where the State and community user groups share equitable decision-making responsibility.

3. Delegated co-management where the State formally authorises recognised community groups to manage natural resources.

Whilst these three definitions explain theoretical CM arrangements, in reality most systems function as a combination of these to form a co-management network (Gray, 2005). A CM network acknowledges that other agencies and organisations function within the natural resource system and can better accommodate interactions between national, regional and local stakeholders. The State may have either a major or a minor role, but it is rarely the only co-player involved (Jentoft, 2005; Gray, 2005). The often large number of stakeholders involved in natural resources at the national level makes CM arrangements difficult to establish at the macro-scale, but nonetheless successful arrangements have been established at local levels.

Carlsson and Berkes (2005) describe CM models as different forms of 'nested systems', either state-nested or community-nested. A state-nested system depicts the State possessing the de facto legal rights over the resource, but a private actor is entrusted to manage the resource, i.e., a State-owned fishing ground. A community-nested system depicts the State operating within a non-public/private sphere where resource users can exercise legal rights over the area of resource. Fishing grounds are again a typical example, where the State exerts authority for purposes of taxation or law compliance, but based on mutual agreements. In this model, the private owner often has need for 'third-party' solutions, requiring involvement from external agents as facilitators for managing resources. The community-nested system was critically appraised in respect of evaluating how it performed as a hybrid governance arrangement for the CCMPA because it is privately owned with access rights for local communities, follows State regulated compliance, and is reliant on a third party, the Honduran Coral Reef Foundation (HCRF) to manage the area.

To enable models of co-management to function, they must operate within a system of allocation of rights and access to the resources in question to generate equitable distribution of benefits between stakeholders. Privatisation and allocation rights, fundamental principles of co-management, are founded on the theory of common pool resources (CPR) and their associated regulatory mechanisms. The term common pool resources, as defined by Ostrom *et al* (2002), are any resources where extractive activities occur making it subject to degradation, and in time can suffer from overexploitation. Different property regimes have been identified making CPRs either government owned as a public good, owned by private individuals as private goods, or communally owned as common property resources. Hardin's (1968) influential work outlining the detrimental consequences of individual rational self-interest to common pool resources when subjected to open access regimes, has been influential in moves to prevent over-extraction and subsequent loss of resources by either privatising or instituting state control to regulate resource use for sustainability.

What a common property regime is founded on is the belief that individuals agree to limit resource use in the expectation that others will do the same (Richards, 1997). Resource use is regulated by membership and rules are established to determine how those resources are used/distributed with agreed mechanisms for enforcement. If there are no such regulatory mechanisms in place, the common pool resource is termed an open access regime which can be abused when they belong to everyone (Dolsak and Ostrom, 2003). These differences, highlighted in Table 1.2, are the foundation for the justification of State or privately owned regimes.

Table 1.2: Attributes of an open access (OA) regime and a common property (CP) regime (Adapted from Richards (1997)

	OA	**CP**
Access	Anyone (inclusive)	Membership (exclusive)
Use/restriction	None	Distribution of access
Input requirements	None	Allocation of resources
Enforcement	None	Agreement for mechanisms

If communities are unable to prevent overexploitation of resources, to counter an environmental disaster the State would then impose external solutions of privatisation or nationalisation. Therefore common pool resources transfer into the public or private domain

but with exclusionary access. There is a danger that if these newly privatised or nationalised resources are not effectively regulated and enforced, it can convert the resources to de facto open access resources because there is insufficient State control and eradication of previously existing community controls (Ocampo-Thomason, 2005).

However, Ostrom (1990) has argued that common property regimes based on self-regulation by community groups (not open access) make both privatisation and state control unnecessary. In the face of increasing pressure on resources, she found that people, i.e., fishers, are more likely to develop communal institutional arrangements to ensure equitable and sustainable use of resources, rather than risk short-term benefits of individual risk (Gibbs and Bromley, 1987). Typically common property regimes are used to regulate resource extraction by using forms of consensus decision-making and social norms. Under such a regime, users are able to exclude others from accessing resources to protect the sustainability of resources and livelihoods. Thus, from the outside the resource appears to be a private good (exclusive), but from the inside it is managed as a community good (inclusive). Tropical coastal fisheries are considered a prime example of a common pool resource because their core resources are vulnerable to overuse by lack of regulation and enforcement. However, Ostrom stated that common property regimes depended on eight conditions being fulfilled: clearly defined boundaries; appropriate scale of regulations with local conditions; inclusive participation in decision-making by user groups; effective monitoring; graduated sanctions for non-compliance; conflict resolution mechanisms; formal recognition of rights by the State; and formation within nested systems in the case of large-scale common pool resources. In addition to these conditions, individuals must have trust in other group members' behaviour to adhere to the collectively agreed-upon rules. Thus common property regimes rely on equitable access to resources, participative decision-making, and shared knowledge, to deter individual opportunistic behaviour (Ostrom, 1991).

Co-management is a governance arrangement that is located between state-ownership and the common property regime described above, through decentralised decision-making and openness of participation. In such an arrangement the State provides legal and enforcement support to community-level management, but recognises the rights of user groups and relies upon equitable access to resources, participative decision-making and shared knowledge for all stakeholders. Agrawal (2002) noted that national government in almost all developing countries have embraced such local-level common property institutions when decentralising environmental and natural resources. Yet the dependency of CM on consensus for decision-

making has led critics to argue that within a CM arrangement policy, decisions are less based on expert knowledge than on negotiation between stakeholders (Armitage *et al*, 2008). Therefore, CM arrangements can be at risk of generating 'politics without ecology'. Another criticism is that the participation is something of a façade. As de Vivero *et al* (2008) state, participation through decentralisation does not bear a linear relationship: greater decentralisation does not necessarily result in greater participation because a paradox can emerge whereby the greater the number of actors, the smaller the role each one plays and the less significant the contribution.

Traditional forms of CM are often exhibited by small-scale and artisanal fisheries, where local communities have extensive traditional knowledge of their resources and an invested interest in the sustainability of those resources to conserve their livelihoods (Gray, 2005). Such forms of traditional natural resource management have been sustainable over long periods of time using consensus decision-making that has not required centralised State regulation to enforce regulations (Berkes, 2002). Levin (1999; 2005; 2006) has reported that these traditional methods, which repeat specific social behaviours over time (ideally in small-scale populations), play an important role in producing this cooperation. In these small-scale scenarios, feedback loops are relatively short allowing different behaviours to become evident quickly. Likewise, Cinner *et al* (2005 a,b) and Cinner and McClanahan (2006) have suggested that cultural norms are effective tools in fisheries management for co-managed MPAs when compared to centralised MPAs in Papua New Guinea.

However, Cinner *et al* (2005a) also point out that specific circumstances have been deemed essential to the success of these traditional arrangements, including dependency on fishing as a primary income, low migration rates, greater distances from markets and effective monitoring. It therefore follows, conversely, that traditional CM arrangements can be undermined by high connectivity with markets, greater movement of people, and reducing dependency on natural resources for income. Where such changes have occurred, the social cohesiveness and feedback mechanisms required to maintain cooperation and enforce societal norms can break down (Jackson, 2007). So while traditional CM has been successful in the past when resources were able to be equitably shared between all users, declining resource availability may produce a decline in the effectiveness of community-based management (World Bank, 1999; Gray, 2005). This suggests that in the face of increasing resource decline, the necessity of State intervention to provide legislative and enforcement support has risen. In such circumstances, as Jones (2001) argues, a more appropriate form of natural

resource management would be a 'middle-ground' arrangement utilising the essential components of both top-down (co-management) and bottom-up (community-management) approaches. To be effective these systems would require effective democratic principles of good governance and devolution of management to accommodate participation.

Whilst the potential for CM arrangements to improve small-scale natural resource management is recognised, they have also received significant criticisms.. These criticisms include devolution of regulatory functions to unaccountable local agencies because of unmanageable costs at state level; loss of power suffered by local resource users; and perpetuation or even exacerbation of inequalities within communities. Whilst Pinkerton (1989) proffered these criticisms over twenty years ago, they are still applicable today in relation to the outcomes of the CM arrangements implemented within the CCMPA between 2004 and 2009. Although it has been recognised that it may take many years for a State to change its policies and regulations to accommodate CM strategies (World Bank, 2004), this thesis reviews why has the governance system in Honduras been ineffective in generating the necessary changes to support decentralisation.

Decentralisation was the focus of the influential work by Pomeroy and Berkes (1997) which examined the critical role that decentralised governance plays in a CM strategy. Thus decentralisation from State-centred governance became the focus of emergent thinking around necessary institutional arrangements to facilitate co-management. Since then, many scholars have applied institutional analysis (Ostrom, 1999; Noble, 2000; Tompkins *et al*, 2002; Yandle, 2003; Rudd, 2004; Acheson, 2006), social theory (Jentoft *et al*, 1998; Pretty and Ward, 2001; Kaplan and McCay, 2004; Armitage *et al*, 2008) and governance theory (Kooiman and Bavinck, 2003; Chuenpagdee and Jentoft, 2007) to the analysis of CM arrangements, natural resource management and MPAs to improve our understanding of the critical components for effective delivery of shared decision-making.

Of these studies, several authors' contributions to the discourse of CM arrangements are relevant to the focus of this thesis for understanding the necessary conditions to enable ACM to be successful. Cheunpagdee and Jentoft (2007) critically appraise the pre-implementation of CM to understand what initial conditions are necessary for success, stating that 'if there is truth to the thesis of path dependency, where we start will determine where we end' (p 1). They emphasise the importance of the cognitive formation of co-management based on developing a shared understanding of the resource problem before effective decision-making

can occur. This understanding has since become one of the central tenets of ACM to enable the acquisition and validation of knowledge for social and institutional learning. Once this cognitive understanding has been achieved, the pre-implementation assumptions held by different stakeholders can then be challenged to create a mutual understanding of the natural resource system being governed.

Another important study by Wilson (2002) (in Ostrom's edited book *The Drama of the Commons*) produced an authoritative review of co-management decision-making through the use of a more comprehensive knowledge base. Reflecting on the failure of conventional fisheries management because of its reliance on 'expert' knowledge, Wilson argued that by utilising detailed local knowledge alongside expert knowledge, emphasis is shifted to the role of collective learning among institutions, scientists and local users. When applied within polycentric hierarchical institutions (decentralised arrangements) multi-scale collective learning networks would be created, connecting the micro-scale knowledge of local user groups with the meso and macro-scale knowledge of experts. Through this sharing of knowledge and experience, the capacity of the governance system to adapt to complexity and uncertainty is enhanced through social and institutional learning. Such learning brings CM into the sphere of complexity which is the theoretical basis of adaptive co-management.

1.2.5 Emergence of adaptive management (AM)

Adaptive management (AM) is a natural theoretical accompaniment for co-management (CM) because it seeks to understand the consequences of multi-disciplinary, multi-stakeholder and multi-level management decisions generated through co-management arrangements. Learning was recognised as the basis for functional co-management, and AM offers an approach that uses on-the-ground actions and policies as the hypotheses from which all learning is derived. Although AM originated in business (Senge, 1990) and systems theory, the works of Holling (1978), Walters (1986) and Lee (1993) spearheaded adaptive management for natural resource management approaches, Friedmann (1987) emphasised that the relationship between iterative learning and action was a hallmark of social learning for all management models, i.e., the link between learning (feedback) and subsequent policy and implementation (actions). By incorporating learning, public policy and experimental scientific monitoring into management decisions, AM taps into the pre-existing ability of resource users to learn from surprises about natural resource systems to make future decisions by observing and analysing the impacts of specific actions (Stankey *et al*, 2005). Critics have

argued that some learning occurs irrespective of the management arrangement used because trial and error is a default model for all learning processes (Gunderson, 1999). However, what distinguishes AM is its purposefulness where agreed goals and objectives (between stakeholders) form the basis of learning against which progress can be measured, advocating learning through systematic and directed selection (proactive), as opposed to incremental learning over time (reactive).

Two important models of adaptive management materialized: passive AM and active AM. Passive AM was coined 'sequential learning' (Bormann *et al*, 1999) where historical data is used to frame the best approach for management based on system reactions to previous policy interventions, but it relies on the assumption that conditions have not altered by applying ex post facto analysis of data and experiences to frame management choices. This approach can lead to ecosystem improvements, but it is often unclear whether observed changes are the result of management treatment/policy or external factors. Active AM by contrast uses policies as experiments to provide data and feedback on management, testing the relative efficacy of different models rather than searching for a single best approach. It has been coined 'parallel learning' (Bormann *et al*, 1999) because multiple policies can be compared and evaluated simultaneously, incorporating factors derived externally to the system being managed.

However, although adaptive management has been applied across a range of resource sectors (water, agriculture, fisheries) and socio-political contexts (developed and developing countries), it has not yet delivered the success it promises in theory. Lee (1999:1) concluded that 'adaptive management has been more influential, so far, as an idea than as a practical means of gaining insight into the behaviour of ecosystems utilized and inhabited by humans'. This is in part caused by inconsistency of interpreting passivity or activity in management regimes, resulting in a vague ability to assess what is required for learning or how it might be applied. Another problem for AM in practice is the dependency on experimentation and the inherent difficulty of testing hypotheses when the system is nested in cultural, institutional, social and political conditions. AM is particularly limited where value-based conflicts exist within the system, i.e., economic versus environmental objectives; administrators versus local user groups (Kusel *et al*, 1996). Buck *et al* (2001) forwarded the notion of 'integrated adaptive management' whereby the public engage with managers and scientists to build working relationships, placing interactions at the centre of social learning. However, such a

laissez faire approach to AM does not address the balance of power and responsibility for resources.

1.2.6 Governance theory for fisheries management

Alongside the convergence of CM and AM in the development of adaptive co-management, Kooiman *et al* (2005) introduced governance theory into marine resource conservation and fisheries management. They promoted the term 'interactive governance' where politically informed approaches to social reform included social values, contextual factors for local knowledge and recognition that no single institution can singularly address governance challenges effectively. Kooiman *et al* (2005) reiterated the need for the engagement of stakeholders representing the state, markets and civil society. Where management concepts have been tool-oriented, focused on management instruments, governance theories consider what 'good' goals should be considered in fisheries management. In order to link management with governance, Kooiman and Chuenpagdee (2005) explained the importance of the relationships between the governing system (societal and political) and the system-to-be-governed (natural and social). A governing system includes the institutions and organisations providing the decision-making process, while a system-to-be-governed consists of the ecosystem resources in question and the associated resource users at the local-scale. Such governance thinking provides a framework for assessing the governability of natural resources, in particular MPAs, because it analyses the relationship and interactions between these two sides. Importantly for ACM, governance introduced system complexity and resilience into the realm of natural resource management to highlight the inherent dynamism and vulnerability of social-ecological systems. These characteristics acknowledge the limitations of what a governing system may achieve given the uncertainties of any system. Therefore, through governance thinking, the idea of learning-by-doing and adaptation to changing conditions allows adaptive management to find a practical application.

The interactive governance theory analytical framework to evaluate MPA performance used by Jentoft *et al* (2007) had three criteria for evaluation:

1. Perception of an MPA as a governing system, as subjects of governance - how effective has the MPA been as an instrument of management? Has it attained its goals?

2. Perception of an MPA as a system-to-be-governed, as objects of governance – how do the social and natural systems respond to management?

3. Perception of an MPA as an interactive system – how does the MPA communicate with and learn from the social-ecological system both as a governing system and the system-to-be-governed?

What Jentoft *et al* (2007) focuses on is the interaction of MPAs with their environment, i.e., the wider ecosystem, what relations facilitate these interactions, and crucially the degree to which MPAs depend on these interactions to remain viable. So, governability of MPAs depends largely on what happens outside of their boundaries requiring the same attention and care as those interactions occurring within the MPA. Importantly, they also state that the idea of MPAs and their values are 'more often imported than home-grown' (2007: 618) leaving them vulnerable to exogenous inputs from social, economic, and ecological forces that cross the MPA's social-ecological borders. In this way, the perception of MPAs as interactive systems connects the governing system to external forces that occur outside of the immediate sphere of management (e.g., macro-economic events), and the outcomes to the governance system that such shocks may have, to link governance theory with adaptive co-management that accounts for complexity and uncertainty.

1.2.7 Emergence of adaptive co-management (ACM)

Although several studies have looked at the use of adaptive co-management (ACM) for floodplain management (Hoggarth *et al*, 1999) and forest management (Wollenberg, Edmunds and Buck, 2000), it was Ruitenbeek and Cartier (2001) who produced a seminal work linking the principles of ACM to bio-economic systems to examine whether ACM emerges from within the system or is a policy intervention introduced from outside the system. While Ruitenbeek and Cartier do not apply ACM to a defined social-ecological system, they offer a concise definition which I have employed for the analysis of ACM in this thesis, which states that ACM is 'a long-term structure that permits stakeholders to share management responsibilities within a specific system of natural resources and learn from their actions. Participants are conscious of the fact that they are operating within a complex system and that they can learn, can adapt and can modify the rules of their participation' (2001: 14). One of the outcomes of the Ruitenbeek and Cartier study was the suggestion that ACM should be passive because it has been shown to emerge naturally from within a system, i.e., rational self-interest generating self-organisation. They argue that trying to introduce ACM through policy interventions may undermine its own goals for effective management by altering such self-regulation. By taking a passive role, Ruitenbeek and Cartier believe that

ACM can either protect the conditions for its emergence, or remove barriers to its emergence within a bio-economic system. Whilst this analysis of ACM is based on economic theory and does not account for complex interactions inherent in social-ecological systems, Ruitenbeek and Cartier raise an important issue –educational capacity. They stress the importance of introducing an educational element into the system for learning and to generate the consciousness for participation by local user groups in a complex system. This element has become a critical enabling condition for successful ACM as a means to develop shared understanding between all stakeholder levels.

Adaptive co-management (ACM) has a large number of synonyms which are often interchangeable, including adaptive management, adaptive co-management, community management and cooperative /collaborative management (Ruitenbeek and Cartier, 2001; Folke *et al*, 2002; Olsson *et al*, 2004). While Ruitenbeek and Cartier (2001) have provided the definition above, they also believe that ACM does not need to be rigorously defined, and instead stress that it is the attributes that define it that should be discussed. So the common attributes shared by most definitions are:

1. the 'co' element; that the rights and responsibilities of stakeholders are defined and shared between the State and resource users groups.

2. the 'adaptive' element; that the stakeholders learn through actions in one period so that actions may be modified for future periods.

An ACM regime must also cover an adequately long timescale to account for variance in the social, ecological and economic systems in which it operates. This allows for an ACM regime to evolve and adapt to changing conditions which will alter the degree of shared decision-making between the different stakeholders over time. Another important attribute included in most definitions of ACM is conscious (taken here to mean wilful) participation in the process to generate the learning inherently linked with adaptation. Participants are conscious of their involvement in the system and through learning can adapt and modify their participation. These features contribute to a flexible system for management of natural resources that can operate across multiple levels and with a range of local and non-local organizations (Armitage *et al*, 2008).

ACM has only recently been considered as a mechanism for building resilience in social-ecological systems. In 2003, Berkes sought to engage with uncertainty and complexity to produce an alternative management approach that was both participatory and adaptive in nature. By linking social and ecological systems together, this approach redefined *resources* not as commodities but as *elements of the ecosystem* that support ecological processes as well as human needs, and redefined *management* to mean *governance*. Thus ACM has emerged as an approach for resolving the methodological and practical challenges of natural resource and fisheries management. It encourages risk sharing and shared definitions of problem and resolutions to generate decisions for the collective good which supports both conservation and sustainable use (Brunner *et al*, 2005). In fisheries systems, this shifts the focus from economic productivity to integrated understanding of systems, feedbacks and sustainability. Both complexity and uncertainty underpin the approach of learning-by-doing, through policy experimentation and subsequent learning (adaptive management) combined with developing stakeholder networks for communication. These linkages between multiple scales allow stakeholders at all levels to learn from outcomes to be able to share in the decision-making process for policy adaptation (co-management). So ACM is the bridge between these two theories – adaptation and co-management – designed to bring management strategies into the realm of governance. It is because of these attributes that ACM provides a place-specific governance approach that supports management strategies in response to social and ecological feedback. In this way, when a process occurs at a larger scale (such as across the Meso-American Barrier Reef (MBRS) system) than would ordinarily allow local-scale management to work, ACM offers a solution that could match multiple scales of management institutions to the scale of the ecosystem (Olsson *et al*, 2004).

Catalysed by complex adaptive systems (CAS) thinking (Levin, 1999; Capra, 1996), ACM is founded on the recognition that feedback processes are non-linear, and that self-organisation occurs 'naturally' within components of a social-ecological system. Complexity thinking provides a way of examining and structuring social-ecological systems because it deals with the dynamic, non-linear relationships between social and ecological phenomena that can result in disturbances to the system (e.g., fishing) (Armitage *et al*, 2008). The multiple combinations of such disturbances also give rise to the notion that social-ecological systems can have multiple equilibrium states, indicating how complex adaptive systems provide valuable new insights into fisheries management through their emphasis on networks, relationships and feedback processes. Within a governance context, complexity indicates the

importance of institutional linkages and flexibility to absorb and respond to changing conditions within the social-ecological system it governs. This understanding challenges the assumptions of conventional scientific approaches to natural resource management that have concentrated on the balance of single-species interactions (Berkes, 2003). ACM is gaining strength as a policy innovation because learning and innovation are more likely to occur through meaningful interactions between stakeholders and giving equal status to knowledge from all stakeholders.

A further underlying assumption of ACM which takes it beyond the parameters of co-management and adaptive management is social-ecological system resilience. Resilience is a dependent measure of a system's ability to resist or absorb disturbances before changing into a new state (Holling and Gunderson, 2002). The notion of social-ecological resilience (SER) has been coupled with complex adaptive systems (CAS) to understand the ability of a social-ecological system to absorb or buffer disturbances to maintain its core attributes. SER theory aims to support the ability of an environment and dependent human communities to absorb shocks, regenerate and re-organise to maintain vital functions and processes. The theory explicitly considers that ecological and social systems are intrinsically linked, and thus the resilience of ecological components is related to and dependent on linkages with social components (Adger *et al*, 2005). In regard to ecosystems, resilience is the capacity to provide ecosystem goods and services – for example, the maintenance of coral structural complexity, biological diversity, and local conditions - to support a functioning ecosystem. Within social systems, resilience is human adaptability to cope with changes in the availability or qualities of the goods and services provided – for example, by coral reefs - to minimise the negative effects on social and economic well-being (Schuttenburg and Marshall, 2008).

SER thinking also complements the internationally adopted directive of sustainable development, popularized by the Brundtland Report (WCED, 1987). Sustainable development aims to maintain a pattern of resource use that meets human needs while preserving the natural environment in the present, without causing environmental degradation that may compromise the needs of the people in the indefinite future. Managing for resilience differs from conventional coral reef management because it not only maintains functions as they are today, but emphasises the need to protect the factors that enable the system to respond to future disturbance events, such as coral bleaching or hurricanes, and this requires an adaptive management approach. Moreover, because changes in natural resources will lead to changes in natural resource use patterns, engaging with stakeholders will enable managers

to build alliances and gain understanding to effectively adapt management regimes to new social and economic conditions. As Schuttenburg and Marshall (2008) claim, 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.

So applying ACM allows for directed policy selection through more devolved, cooperative management where governors and the governed share learning with the aim to reduce conflicts. Whilst this management approach uses a scientific methodology to establish causes and effects of policies, it needs to move the process beyond baseline information gathering. To do this effectively when dealing with risk and uncertainty, only a strategy that enables adaptation will offer a mechanism for coping with change. Risk is a social construct (developed by experience) with different meanings for different people, involving analysing the potential of an event occurring and the severity of the outcomes of its occurrence in terms of costs and benefits (Mazaika *et al*, 1995). Uncertainty involves situations where the probability of an outcome is unknown – for instance the reproductive capacity of target species at different stock sizes. For a social-ecological system structure this means selecting which variables should be considered in its management (Walters, 1986, cited in Stankey *et al* 2005: 28)). Derived from AM thinking, adaptive co-management accounts for risk and uncertainty in social-ecological systems because it explicitly works to analyse the cause and effect relationships in systems, and to adapt assumptions held about those relationships (Thomas, 1999).

However, ACM requires a willingness to experiment using policies as hypotheses because, as Stankey *et al* (2005: 29) stated, ‘ if management for uncertainty must be accompanied by an assurance that nothing will go wrong, then we have a recipe for inaction’. To achieve this permission considerable capacity- building to develop trust between stakeholders and especially local user groups is required. Resistance to this management comes from those who perceive adverse impacts on their interests – for instance, fishing regulations mean in the short-term fishers bear the livelihood costs of regulatory experimentation as described by Johnson and Williams (1999). In the face of ‘experimental’ management approaches requiring the system to learn from mistakes and crises, the local user groups, i.e., fishers are often worried about economic shortfalls and reduced ability to earn a living from a resource. McClanahan and Castilla (2007) explain that livelihood options are part of the resilience of small-scale and artisanal households, and strategies that will undermine this resilience without viable alternatives will be met with resistance. Therefore, a management regime that

supports and acknowledges this occupational pluralism will be more warmly received. Gelcich *et al* (2008) also point out that time is necessary to allow fishers to engage with co-management before their perceptions of its success will be altered. Time for learning and education of the local communities is an important part of the systematic nature of ACM to overcome distrust, and therefore social and political collaboration are key to success. In addition, ACM relies on local communities to engage with issues at ecosystem level rather than only about a particular issue (Olsson *et al*, 2004a). It is this learning and willingness to be involved in participation and learning that was recognised by Ruitenbeek and Cartier (2001) when they emphasised the inclusion of educational capacity for ACM to succeed. To generate this ability to learn through reflexive, iterative participation, double-loop learning is advocated for ACM (Plummer and Armitage, 2007; Armitage, 2008). Double-loop learning allows for specific problem-solving but also works to alter the underlying assumptions and beliefs held by different stakeholders to promote shared understanding.

Nevertheless, putting ecosystem management principles into practice has remained a challenge. In an attempt to overcome this challenge, Carlsson and Berkes (2005) have proposed six steps that would facilitate ACM. First, the social-ecological system that is being managed must be defined as certain groups or communities, a particular area, or a particular resource. Second, the essential management tasks and problems to be solved must be made clear by identifying the activities carried out with the resource, how people behave in order to manage these activities and the short, medium and long-term management decisions required. Third, it should be decided which participants will be involved in the process, which will both reflect and determine how management is organised at each level, how decision-making power is distributed and how rights and responsibilities for resources are allocated. Fourth, the linkages in the system should be assessed, specifically across organisations and geographical boundaries. Fifth, the capacity-building needs of the stakeholders to enhance the skills of people and institutions at all levels should be identified, not least to enable stakeholders to develop the ability to identify and resolve problems on their own, allowing the system to reorganise naturally by itself (passive ACM). Sixth, a feedback mechanism must exist to enable suggestions for improvements to the management and policy making to be put into practice.

However, whilst these recommendations provide a framework for the application of ACM, they do not set out pre-implementation conditions for the social-ecological system in question. As outlined in section 1.2.6, Cheunpagdee and Jentoft (2007) highlighted the

critical importance of cognitive understanding of the system before initiating an ACM approach to provide sufficient enabling conditions for management. Armitage *et al* (2008) have built on Carlsson and Berkes (2005)'s steps to identify ten principal features for successful ACM which include pre-implementation analysis. Table 1.3 lists these conditions along with a brief explanation of their significance. These conditions are based on the understanding of ACM as a flexible social arrangement that can develop rules, institutions and incentives to direct outcomes in an uncertain system.

However, empirical knowledge of the effectiveness of the ACM regime remains sparse. Both Carlsson and Berkes (2005) and Armitage *et al* (2008) derived their respective lists of conditions for successful ACM from relatively few case studies. They do not investigate the means for coordinating and measuring each of the above steps beyond these specific case studies; they do not propose a measurable index for application to all suitable social-ecological systems (SES); and they have not explained the relative importance of each condition, or which combination of the conditions would have the greatest significance on a localised case study. On the other hand, although critics have argued that there is a lack of evidence of evaluation of outcomes for ACM, what Armitage *et al* (2008) have achieved is to demonstrate that there are several key attributes associated with their ten conditions (Table 1.3) which have a considerable influence on the success of ACM. These attributes include a greater recognition of different needs of stakeholders; an emphasis on the distributive arrangements among stakeholders; a continued effort to build on culturally embedded, formal and informal rules and norms; the need for horizontal and vertical linkages and networks to foster trust building and social learning; the requirement for a wide variety of types and sources of knowledge; the importance of shared knowledge among stakeholders; and the necessity for enhanced capacity among management organisations to respond proactively to uncertainty. The absence of any of these attributes or requirements for ACM may have a negative impact on the resilience and sustainability of any social-ecological system.

Armitage *et al* (2008) point out that ACM is not a panacea for governance and will not be appropriate in all cases where some of the ten conditions cannot be met. Moreover, ACM is a long-term social process rather than a technical or structural measure, and other social and market incentives are also needed - ACM is only one of a suite of governance options. Additional research into individual case studies is required to identify the internal and external stresses to the system that prevent learning and feedback, and the

Table 1.3: Ten conditions for successful ACM (adapted from Armitage *et al*, 2008)

1	A well-defined resource system characterised by a relatively immobile resource stock which is less likely to generate institutional challenges or conflicts, while creating an enabling environment for learning.
2	Small-scale resource use which reduces the number of competing interests, complexities and organisations.
3	Clear and identifiable social entities with shared interests that help to build trust and linkages. In situations without these connections, efforts by local and regional organisations to achieve better outcomes may be undermined by non-local economic and political forces.
4	Reasonably clear property rights to the resources in question which facilitates governance innovation and learning, associated with corresponding rights holder responsibilities.
5	Access to an adaptive range of economic, regulatory and collaborative management measures which apply diversity to achieve desired outcomes.
6	Commitment to support a long-term institution-building process where stakeholders accept the long-term nature of the process. Commitments of this type can provide a degree of relative stability to counter numerous stresses from within and outside the system.
7	Provision of training, capacity building and resources for local, regional and national level stakeholders to enable development of the skills required in an adaptive co-management context.
8	Key leaders and individuals that can maintain focus and drive for collaboration, with the ability to create opportunities for reflection of feedback and learning. Ideally these individuals should have a long-term connection to a 'place' or resource or within policy bureaucracy, to act as conflict resolution personnel.
9	Participant openness for successful plurality of knowledge, both expert and non-expert, to identify problems, frame solutions and analyse the information. Substantial contributions to system understanding, trust building and learning can be made by both formal and informal knowledge.
10	Supportive national and regional policy for collaborative management efforts will enhance success of adaptive co-management processes. Consistent support across policy sectors will encourage clear objectives, provide resources and distribute power to local actors and user groups.

presence or absence of the above acknowledged conditions as a measure of the success and suitability of ACM governance. In particular, research is needed into the ways in which slow and fast moving variables affect the resilience of a system. Slow-moving variables operate at larger spatio-temporal scales to promote stability and add a 'memory' effect of the system to resist disturbances, e.g., long-standing institutions; values in a social system. Fast-moving

variables operate at smaller temporal or spatial scales and can overpower attempts by slower moving institutions to promote re-organisation of the system, e.g., a disease outbreak; individual preferences in a social system. It is important to understand the socio-economic and ecological processes that can de-stabilise these slow variables to create a responsive management arrangement, and this should present the central focus for ACM evaluation.

The central question for this thesis is: how far does the concept of ACM help us to understand the working of the CCMPA? This is the question which the next section begins to answer.

1.3 The Caribbean Context

1.3.1 The Caribbean in general

The characteristics of small-scale fisheries in the Caribbean present challenges for management (Salas *et al*, 2007). These characteristics include the use of multiple gears, selection of multiple target species often caught indiscriminately, remote landing sites, and seasonality. Most management measures focus on input controls, i.e., size limit, gear restrictions, closed seasons, closed areas and permits because the legal framework in existence is weak, lacking the capacity for monitoring and surveillance. Yet some government agencies have begun to transform their structures and operations to become increasingly favourable to stakeholder participation in decision-making, expressed through changes to institutional arrangements, national legislation and sectoral programmes (Ocampo-Thomason, 2005). 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 the result of several factors, including 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).

In 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 manage all resources relating to wildlife. The vision of the department is to 'guide by a strategic plan for natural resource management in a decentralised, participatory manner, establishing alliances with key players involved with principles of quality, research, development and innovation' (COHDEFOR webpage). Management approaches have since focused on developing private sector partnerships (non-State owners) to promote better co-management practices that reduce the environmental impacts of the tourism, fishing, agriculture and aquaculture industries while developing a mechanism for evaluating the performance of management (Hernandez, 2006; McField *et al*, 2008). One such alliance has been the collaboration with the NGO - Honduran Coral Reef Foundation (HCRF) - to manage the CCMPA, as discussed in section 1.3.2.

Natural resource management in Central America 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. As Renard *et al* (2001) point out, 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 in centuries of evolution but are the result of recent adaptations to a great diversity of influences. This has created certain characteristics unique to the region including: dependency on monoculture and exports (crops); 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. Conflicts between groups have been observed for management to deal with largely arising from issues around rights and access to resources.

McConney *et al* (2007) have assessed co-management arrangements and processes in three case studies in the Caribbean: Barbados, Grenada and Belize. Belize, a regional partner to

Honduras, has become the lead nation for conservation in the MBRS region following the 'regional seas cooperative arrangement' of the Caribbean Environment Programme which aims to promote regional coordination for conservation of large-scale marine ecosystems. The Protocol on Specially Protected Areas and Wildlife (SPAW) was instigated for the wider Caribbean region and aimed to create a network of protected areas to maintain and restore ecosystems and ecological processes (UNEP webpage). The research framework used by McConney *et al* (2007) was designed to show how local contexts and exogenous factors shape the interactions that affect the feedback processes of the system, and the consequences for social and institutional learning. The results generated from the Belize case study indicated that co-management arrangements do not necessarily involve broad-based community participation in decision-making structures and processes. Indeed, communities very often appointed representatives who had very little impact on the management design or decisions that affected their use of the resources. This case study highlighted the important challenges for management in the Central American countries of the Caribbean region: the need for cooperation (moving away from crisis management); organizational capacity (to manage conflicts); social/cultural fit (willingness of individuals to accept leading roles); and, critically, trust and respect between stakeholders. Although the results from the Barbados and Grenada case studies indicated more successful applications of co-management arrangements, all three cases raised questions about how co-management arrangements can be strengthened. In particular, they highlight the role of external agents in management; the extent of stakeholder participation; and the place of the principles of adaptability and flexibility for system learning (Pomeroy *et al*, 2007).

Gray (2008) furthered this research to examine the networks and social relations in which stakeholders have to engage to participate in natural resource management. She concluded that successful management is dependent on multiple interpretations of knowledge and environmental problems at local and regional levels, sustained by actors within the management network. Through this analysis of co-management arrangements, emphasis is placed on negotiating an agreement between stakeholders as to what knowledge will be produced within different scales, and how that knowledge is produced. In this way, scientific and local knowledge are not necessarily understood through a shared perception, but accepted by all stakeholders through their institutional interpretation and incorporated into the decision-making process, i.e., combining local fishing knowledge with scientific stock assessment to find mutually agreed solutions. Gray argues that negotiating agreement about

different kinds of knowledge rather than negotiating a single interpretation of knowledge helps to produce local legitimacy and improve the enforcement capacity of management.

1.3.2 The Cayos Cochinos Marine Protected Area (CCMPA)

The Cayos Cochinos are located 15 km off the Caribbean coast of Honduras in Central America (Figure 1.2). The Cayos Cochinos form an extensive coral reef system that forms the southern-most part of the Mesoamerican Barrier Reef System (MBRS, Figure 1.3) (Harborne *et al*., 2001). The Cayos Cochinos consist of two main islands and thirteen smaller cays. The area was declared as a Natural Marine Monument after the Smithsonian Institute conducted an extensive biological analysis of the area to determine the damage caused by industrial fishing in 1993, which was subsequently published as a supplement of the Revista de Biologia Tropical in 1998. Following this designation, the CCMPA became managed by the Honduran Coral Reef Foundation (HCRF) for the conservation of its marine resources, covering an area of 489.25 km^2 (Figure 1.4).

Using IUCN categories, the CCMPA was initially a Category III reserve for the conservation of a specific natural feature. In reality it was a combination of categories incorporating a central no-take zone (Category I); an ecosystem protection and recreation/tourism zone (Category II); and a conservation zone with closed areas and species monitoring (Category IV). So the CCMPA is a multiple-use protected area which uses different levels of protection - most critically a no-take zone (NTZ) surrounded by areas of lower protection. Most importantly, as a result of the CCMPA, the Cayos Cochinos changed from being an open access resource to a private good owned by a conglomerate of international environmental NGOs and Honduran business leaders. Whilst recognising the traditional rights of the indigenous Garifuna people through restricted rights of access for communities, the CCMPA was not managed by a common property regime. The HCRF was therefore established to have sole responsibility over the administration of the area. A moratorium was placed on fishing and a 24-hour navy patrol was established to enforce it. Those most directly affected by regulations were the Garifuna fishing communities living both inside the CCMPA and within its sphere of influence, who have relied on the area's marine and terrestrial resources as their main source of livelihood for 211 years (Brondo and Bown, *in press*).

Figure 1.2: Map of Central America showing Honduras highlighted in pale yellow. Honduras shares the Caribbean coast with Nicaragua and Guatemala (www.world.maps.co.uk). Inset map of Latin America (Journey Latin America, 2010).

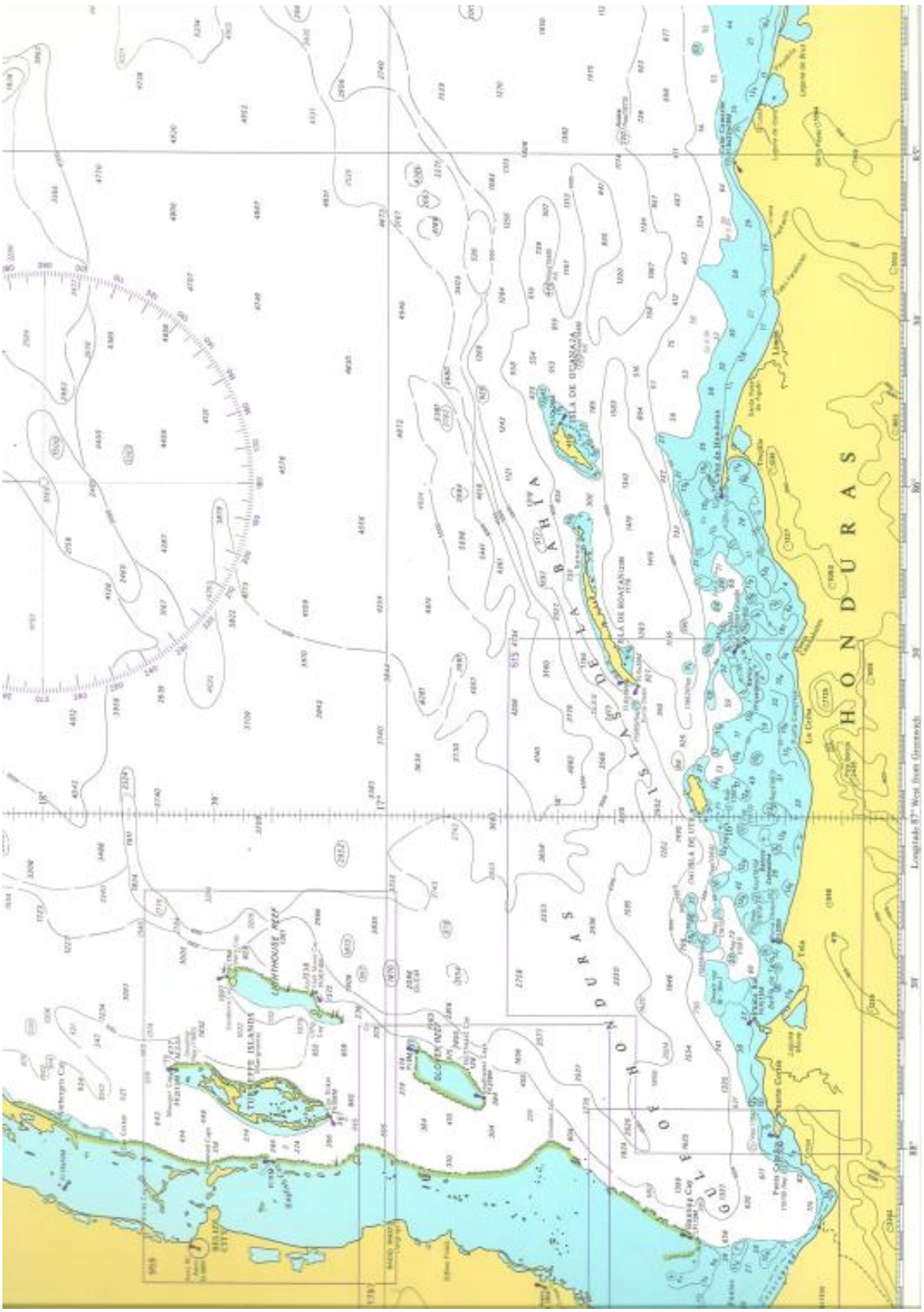

Figure 1.3: Map of the north (Caribbean) coast of Honduras showing the southern MBRS and neighbouring countries (Belize and Guatemala) (Admiralty Chart, 2007).

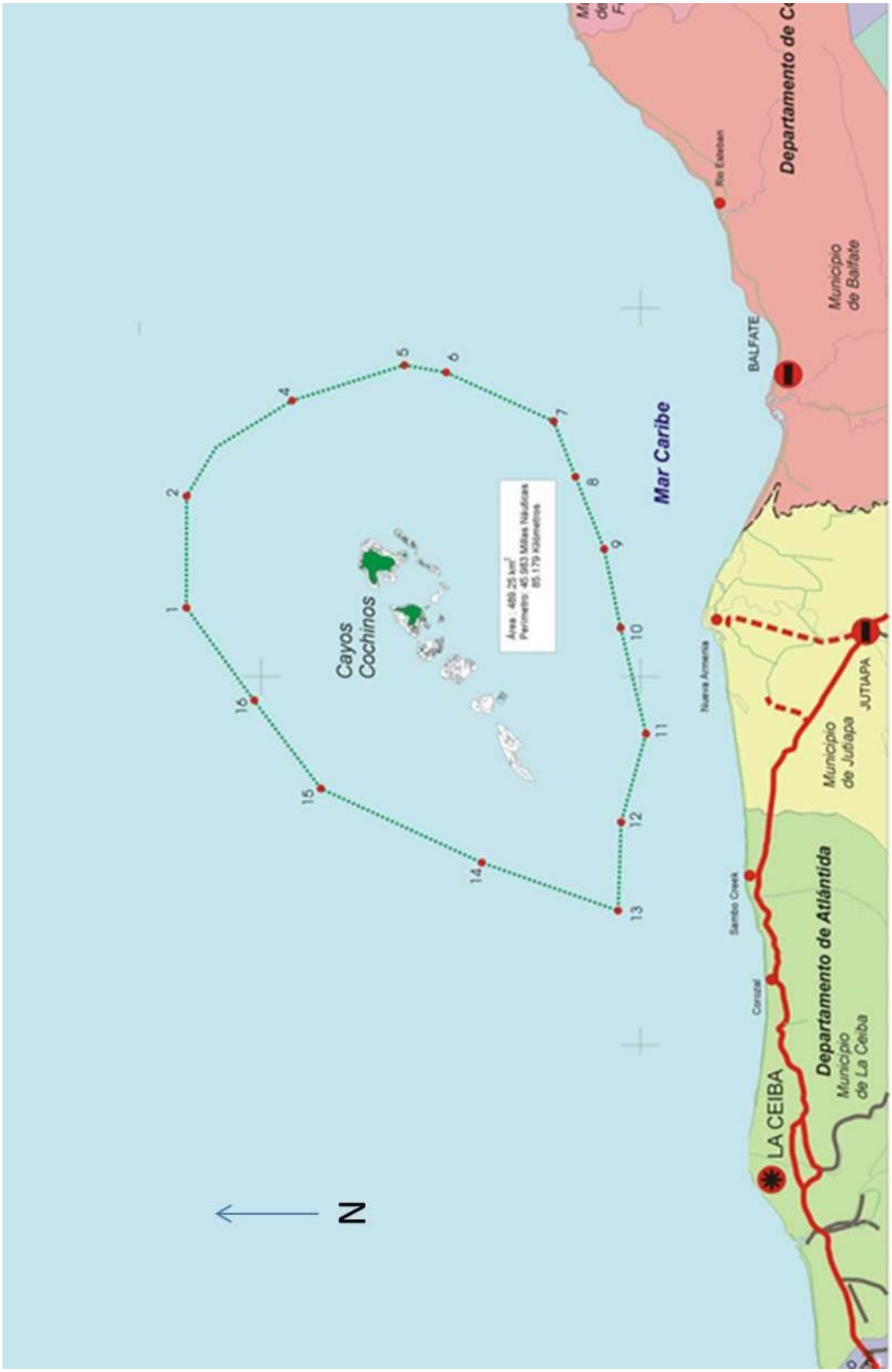

Figure 1.4: Extension of CCMPA boundary covering 489.25 km^2. (Source: CCMPA Management Plan 2004-2008).

The Garifuna are traditional artisanal fishers and resource users of the MPA, 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 labourers on fishing trawlers and fruit plantations. The mainland Garifuna communities (Neuva Armenia, Rio Esteban, Sambo Creek, Corozal) have temporary dwellings on some of the cays in the CCMPA, which were traditionally used during overnight fishing excursions. Two of these temporary dwellings now have permanent resident populations (Chachahuate, East End) making them particularly vulnerable to the management plan regulations because they rely on fishing for subsistence and trade and have few alternative livelihood options.

Before and after the establishment of the MPA, the Garifuna (as the local resource users) were blamed for the environmental destruction that has since been linked to a long history of industrial fishing in the region. The conflict between the industrial fishing fleet and small-scale fishers along the north coast reached a climax in 1992 when the export value of shrimp and lobster was US$ 97 million, accounting for 12% of all export earnings. This value had risen by 33% in just 12 months in response to a substantial increase in the number of commercial vessels registered to Honduras (World Bank, 1999). In comparison, the total value of the small-scale fishery in the same region was estimated to be only US$ 555,000. For the Garifuna communities, fishing has always been a critical component of a risk reduction strategy for livelihoods, where access to fishing resources acted as a safety net to provide both income and food. However, the industrial fleet not only reduced the income of small-scale fishers by targeting the same species, but damaged the coastal environment, threatening the sustainability of small-scale fishing livelihoods. The industrial fishery was worth almost two hundred times the value of small-scale fishing, and accounted for the vast majority of the environmental damage (DIGEPESCA, KI interview 02/06/06). The moratorium on fishing activities, whilst responding to the immediate threat to the biodiversity of the CCMPA, generated an immediate and substantial threat to the livelihoods of the Garifuna.

After over five years under the moratorium on fishing, successful mobilization of national Garifuna organisations, especially the Black Fraternal Organization of Honduras (or

OFRANEH), led to its lifting in 1999 and the Garifuna were permitted to return to subsistence fishing. Industrial fishing remained prohibited within the CCMPA boundaries, yet it did continue in the surrounding coastal waters. This created two new problems for management: 1. loss of biodiversity and larvae from surrounding areas to maintain commercially important stocks inside the reserve, and 2. an increase in small-scale fishing pressure inside the reserve because alternative fishing areas remained under threat from industrial activities. Uncoordinated national environmental strategies also meant that the CCMPA remained legislatively isolated from national and regional policies.

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 HCRF for the subsequent ten years (2004-2014), recognised as a Category VI protected area under the IUCN designations. This re-categorisation came after the World Parks Congress 1992, which focused on natural resources within protected areas to meet the needs of local people to alleviate poverty (Locke and Dearden, 2005). The result of the Congress led to the introduction of new IUCN categories for protected areas - Category V (culturally modified landscapes) and Category VI (managed resource areas) – which both supported sustainable development goals. In 2004, the World Wildlife Fund (WWF) helped to develop a five-year management plan with the HCRF that was claimed to have been designed with the participation of the local community (Brondo and Bown, 2007). Once again, the Garifuna faced significant restrictions on their fishing activity. This management plan was conservation driven, but recognised as an NGO-led co-management arrangement between the HCRF and the Municipality of Roatan. Although the principles of good governance and decentralisation were being applied at the macro-national level, co-management of the CCMPA did not include sufficient micro-level/local community participation. Therefore, while the ecological value of the marine resources in the CCMPA was recognised and a management strategy employed to facilitate sustainability of these resources, the local communities felt victimised by regulations and antagonistic towards management.

Exacerbating the difficulties experienced by the communities, in 2007 the HCRF agreed to allow filming of the Reality Show ‘Isla de la Famosa’ within the CCMPA. This generated significant local protest over loss of income and inequalities of regulatory enforcement in favour of people taking part in the Reality Show. As a result of political and social pressure, the HCRF agreed to revise the management plan for the CCMPA earlier than planned. The involvement of the TNC favoured a rapid appraisal methodology, but the new management

plan was designed as an adaptive co-management arrangement allowing a far greater role for local community groups and government agencies than the previous plan. To appease the growing social unrest, the second management plan responded far more strongly to socio-economic criteria than to the ecological criteria of its predecessor, thus creating a plan driven by 'politics without (sufficient) ecology'.

To contrast the two management cycles: the first management cycle (2004-2008) was a co-management arrangement between the decentralised State (Municipality of Roatan) and the HCRF; whereas the second management cycle (2008-2013) was an adaptive co-management arrangement including a far greater range of stakeholders into the governance process. This thesis examines to what extent these two management models adhered to their normative principles, and how successful/effective each model has been in achieving its ecological, socio-economic and governance objectives by adopting the ACM model of governance. It will examine the argument that the success of the first co-management arrangement created the enabling conditions for the successful adaptive co-management system in the second management cycle. The thesis focuses especially on the perceptions of management held by different stakeholders in the second governance framework, to identify strengths and weaknesses in the governance system for participation, and how it adapted through learning and resilience to external disturbance events.

1.4 Thesis Outline

The approach of this research to examine the sustainability of ecological resources and local livelihoods poses significant methodological and epistemological challenges. Chapter 2 will set out a conceptual framework which provides clear definitions of management and governance, as well as ethical and epistemological considerations. It will introduce the methods used, explain the rationale behind the choice of methods, and the context of the CCMPA including each case study community – Rio Esteban, Nueva Armenia and Chachahuate – with an explanation of how each site was selected. Chapter 3 will focus on the first research question: has the sustainability of natural resources been enhanced by co-management and /or adaptive co-management? I will describe the historical and current resource use patterns by the local communities, and present an analysis of local ecological knowledge (LEK) and its inclusion in the decision-making process during both management cycles. Chapter 4 will answer the second research question: has the sustainability of local community livelihoods been enhanced by co-management and/or adaptive co-management? I

shall examine the socio-economic impacts of each management cycle in all three case study sites to review the implications for management compliance and participation. The third research question is addressed in Chapter 5: has the flexibility and adaptive capacity of governance been enhanced by co-management and/or adaptive co-management? It will examine the two management cycles in the context of the necessary attributes to comply with the principles of equitable participatory governance. Chapter 6 draws together the main findings of this thesis and presents a review of the effectiveness of the CM and ACM approaches used over the two management cycles in the CCMPA, and also identifies further research implications not addressed in this thesis. Chapter 7 provides final conclusions of the two management plans and presents future implications for management of the CCMPA in the impending third management cycle.

CHAPTER 2: CONCEPTUAL FRAMEWORK, METHODOLOGY AND CASE STUDY DESCRIPTION

2.1. Introduction

In this chapter I outline the conceptual framework of this thesis and use of case studies, the justification for using perceptions data to analyse the effectiveness of management arrangements in the CCMPA case study will be outlined. I then explain the case study selection criteria and describe each case study site in detail to provide an overview of natural resource use at the local-level. This is followed by a detailed explanation of the research design and methods including the data collection techniques applied (household surveys, focus groups, key informant interviews and oral histories), the role of translators and the role of students in survey work. Analytical procedures are then outlined along with a review of the reliability and validity of perceptions based data. Finally ethical considerations, methodological issues and methodological reflections are discussed.

2.2. Conceptual framework

The evaluation of management effectiveness is often too complex to be measured using only one method or single discipline. Mixed methods have evolved as a mechanism by which rationalist and 'objective' information collected by the natural sciences is combined with 'subjective' human sciences of feelings and experiences. Dilthey (in Teddlie and Tashakkori, 2009:90) believes that the natural sciences provides casual explanations of natural phenomena from an outsider's view point, while the human sciences provide understanding of human behaviour from an internal point of view. This combination allows researchers to link macro structures of power and institutions (State government) to micro phenomena of perceptions and thoughts (individual understanding of resources). Blackstock et al (2007) suggest using mixed methods as a more effective way to uncover different aspects of a complex reality, i.e., a social-ecological system, where using a single data collection method would either misrepresent information or fail to identify relationships within the same system. This thesis uses mixed social science methods to provide triangulation of analysis and interpretation (Denzin, 2006) in examining the CCMPA case study.

A mixed methods approach is also the most appropriate methodology to examine an adaptive co-management (ACM) model where feedback from the social, economic and cultural systems is an iterative element of the design. Feedback from the social-ecological system will occur continuously over time which does not allow for a linear data-analysis arrangement, even more so when the data collection in this thesis has been conducted over four separate periods of time (2006, 2007, 2009, 2010). Between these periods, the attitudes and perceptions held by different stakeholders will have been altered by events in the months preceding data collection. This has been clearly evident at the local-level in all three communities, reflecting changes in participation with management and dependency on natural resources. Therefore, a mixed methods approach accounts for these complex relationships between stakeholders and social-ecological conditions by evaluating common trends and concepts that are emergent from different techniques. Perceptions analysis and discourse analysis form the basis of the research analytical framework developed which are discussed below.

The conceptual framework used in this thesis has been determined by the conditions for CM and ACM as identified in Chapter 1, in combination with the three aspects that are now regarded by fisheries co-management scholars (Holling *et al,* 1998; Charles, 2001; Hilborn, 2007; Beddington *et al,* 2007) as central to successful fisheries management: biological sustainability to produce a maximum sustainable yield of target species whilst maintaining ecosystem resilience; socio-economic sustainability, which for the purposes of this thesis is interpreted as local livelihoods sustainability, to maintain an income from natural resources distributed equitably between communities; and governance sustainability to produce the most effective management model to achieve biological and livelihood sustainability in a locally specific context. Thus, this conceptual framework incorporates ecological, socio-economic and governance criteria that require different assessment indicators. This framework creates a normative system against which to compare the actual process (policy) and outcomes (indicators) of both the CM and ACM management model used in the CCMPA. Thus, it enables the empowerment of different stakeholder groups in the governance system to be analysed in terms of their willingness and ability to manage the natural resources of the CCMPA in an ecologically and socio-economically sustainable manner. If the co-management arrangement is strong with a high degree of equitable distribution of power, legitimacy and transparency, it would be expected to produce a high degree of environmental responsibility and conservation success. Conversely,

if the co-management arrangement is weak, it would be expected to produce a low degree of conservation success because socio-economic sustainability would be prioritised ahead of environmental considerations.

The research presented herein uses perceptions data from all stakeholders within the governance arrangement of the CCMPA to evaluate whether technical performance indicators (biological data) are more important than behavioural data in the assessment of natural resource management. As Rose-Ackerman (2006) points out, perceptions about natural resources may be more significant than the actual conditions of those resources. Specifically, stakeholders' perceptions of their surroundings (society, governance, natural environment) may be more relevant to management than objective observations of resource abundance. Kaufmann *et al* (2006) also state that without perceptions data, benchmarks provided by current ecological, socio-economic and governance indicators would be incomplete because although objective standards provide comparability, they do not account for the 'soft' issues (such as culture and migration) that pervade and affect the critical measure of success. On this view, perceptions are a valid and complementary assessment tool to add insight of how societal governance and natural resource management operate.

Perceptions-based methodologies follow a critical realist approach, which mean that the objects of the investigation (respondents) have internal mechanisms that can be objectified to produce outcomes. With this internal mechanism, individuals will continuously alter their understanding of the world and correspond to the way if affects the world around them. As Graeber (2001) points out, applying this value-laden approach to a social science methodology must be accompanied by the caveat that these social structures are subject to extreme flux and change. Decisions are inherently biased because of the use of heuristics; that is, individuals make decisions based on their experiences which allow them to make educated guesses, intuitive judgments and apply common sense to an unfamiliar situation. Fleming (2004) described heuristics as a problem-solving process where the most appropriate solution, of which there are several possibilities, is selected at successive stages and used in the decision-making process. This iterative staging of decision-making is important in perceptions analysis because it considers the way that individuals may interpret information and experiences about a particular topic, subjecting that perception to individual bias. Therefore, perceptions-based methodologies

need to identify and accept such behaviour during data collection and its subsequent interpretation.

Murray (1938) identified three types of perceptions that still remain significant for the analysis of perceptions data: 1. private beta press (individual perceptions of the environment); 2. consensual beta press (a group's collectively held perception); and 3. alpha press (a trained observer and non-participant view). These three types of perception are likely to be inconsistent with one another because differences exist in perceptions between user groups and individuals, especially if user groups participate in decision-making. For example, fishers most directly involved with decision-making of the management plan may perceive it to be performing well in all objectives, whereas those fishers not involved with the decision-making process may perceive the plan to be underperforming.

Perceptions of the effectiveness of the management plan in achieving its stated objectives can be compared to the actual success as recorded by the biological and socio-economic indicators that are chosen and measured by the decision-makers and managing agency. A conceptual framework and justification of methodological approaches has been developed to incorporate measures of perceptions established and developed from wider governance indicators (accountability, transparency, legitimacy) and ACM measures (commitment, capacity, leadership). Perceptions information followed both an ethnographic and positivist approach combining open-ended questions and pre-defined variables. Perceived effectiveness has then been used to assess the success of the management plan in three stages: the developmental/initiation stage; the process of management stage; and the output/delivery stage.

Perceptions information provided reasoning and evidence of the delivery of the management plan in addition to the objective biological and socio-economic monitoring. This data was based on indicators as measures used to quantify or qualitatively describe the success of technical or monitoring characteristics of the fishery system, and also to measure externalities which society considered valuable to monitor over time. As Boyd and Charles (2006) point out, using perceptions data in this way is important in community-level management to know which components of the social and governance environment should be monitored. A holistic set of indicators were developed to monitor community, ecological, institutional and socio-economic

dimensions of the artisanal fishery that could be used to monitor successful management of the local conditions.

To make the best use of perceptions data within the conceptual framework outlined above, elements of grounded theory have been used to devise a data collection-analysis approach. Grounded theory has become one of the most widely used frameworks for analyzing qualitative data, defined by Strauss and Corbin (1998:12) as 'theory derived from data, systematically gathered and analysed through the research process. In this method, data collection, analysis, and eventual theory stand in close relationship to one another'. Thus, there are two main features of grounded theory: the development of theory out of data; and the iterative approach. Iterative means that data collection and analysis proceed together and repeatedly refer to each other (Bryman, 2008). I have used elements of grounded theory as the basis of my analytical framework because in a situation with little or no prior data, it allows for the development of case specific data to apply a conceptual analysis to a specific context. However, I have not used a complete grounded theory approach, but have generated concepts to evaluate theories (as opposed to generating theories) by identifying concurrent themes of the governance system and characteristics of individual and institutions within that system. This allows specific stakeholder characteristics and governance conditions for successful CM and ACM to be identified through coding and temporal comparison. The case study can then be embedded in the implicit theories of what themes of participatory governance are important in the CCMPA.

The constant comparison of data and analysis allows concepts within categories to emerge, revealing contrasts between different forms of data that allow the researcher to identify other important research themes during a fieldwork period. Therefore, this element of grounded theory suited the methodological design of this thesis because my fieldwork was conducted in four distinct phases. So, data collection and analysis provided methodological feedback that allowed the data collection to expand in response to newly emergent characteristics or conditions.

2.3. The use of case studies

Case study research focuses on understanding the complexities and particular nature of a specific case, such as, of a governance system, to enable a comprehensive analysis to be conducted of specific conditions (Bryman, 2008). The CCMPA was selected as a case study because it

provides a suitable context for intensive examination of co-management models for fisheries management. It specifically afforded the opportunity for a change in the management model used to govern the CCMPA from a co-management arrangement to an adaptive co-management arrangement. This additional longitudinal element, as described by Yin (2003), enabled management to be invested over two distinct junctures – the first management plan (2004-2008) and the second management plan (2008-2013). While these models have been examined in the CCMPA case study as a whole, it has also been further sub-divided into three distinct community case studies. Heterogeneity of these communities was assessed using comparative analysis of participation and outcomes of both management cycles.

Although six Garifuna communities exist within the sphere of influence of the CCMPA, only three were chosen for detailed research – Rio Esteban, Nueva Armenia and Chachahuate. Rio Esteban and Nueva Armenia are both coastal communities, and Chachahuate is a cayan community located inside the reserve boundary (discussed in detail in the next section). These three communities were selected because of their representation of fishing dependent households; their activeness with the HCRF at the beginning of this research; and their pre-existing relations with Operation Wallacea (Opwall). East End, the sister community to Rio Esteban located inside the reserve, was also originally selected to provide an equal number of coastal and island case studies and because it is the location of the Naval Base to accommodate the patrol guards. However, there are very few households in East End (n=12) and these were mainly vacant during the periods I spent in the community. Therefore any interviews conducted with fishers or households in this community were used to verify information from the other locations, but were not included in any analyses because of the small sample size (2006, n=3; 2007, n=2; 2009, n=3; 2010, n=4).

I particularly wanted to investigate the relationship between the management model and the sustainability of the ecosystem, local livelihoods and the governance framework as perceived through the eyes of the lowest level stakeholder (general community member) to assess the impact of CM and ACM in each community. To collect the in-depth data necessary to examine these research questions, it was advantageous to live in each community for a period of several weeks (June-August). By living in homestays and taking part in daily life as a participant observer, it was possible to develop a contextual understanding of Garifuna culture. I spent a

total of twelve months (over four years) in these communities, splitting my time evenly between sites. In this time, a trust developed between the communities and I (as Opwall) that permitted me to conduct interviews, observations and focus groups with different individuals and groups in each location. I believe this trust resulted in interviews and discussions that were open and honest accounts of individual experiences, and that this trust developed from three sources: 1. my connection with Opwall, who have been assisting the local communities to develop alternative livelihoods; 2. because I did spent time living in various different households in the communities, which was considered unusual for a researcher[1]; and 3. the novelty factor that a young white woman had an interest in artisanal fishing.

As a case study, I do not attempt to make generalisations about the effectiveness or conditions available for CM or ACM in other MPAs because the findings presented in this thesis are culturally and institutionally unique to the CCMPA. However, this research does have some external validity as an example of participatory governance and natural resource management models in the MBRS region because Honduras, like many other Latin American countries, introduced decentralisation of government agencies.

2.4. Field site selection and data collection procedures

In 2006 I conducted a pilot field season in Honduras, using this time to familiarise myself with the CCMPA location and associated communities, the Garifuna culture and Opwall (my CASE partner organisation), who I have been working for as a social science supervisor over four summers. This section will explain the site selection criteria and provide descriptions of each community, discuss the sampling frames and strategies for each site, examine sampling issues and bias, provide details of data collection procedures, and the involvement and supervision of the translators and students.

2.4.1. Field site selection

The identification of field sites was partially pre-selected during the proposal stage of my thesis in conjunction with Opwall because they had already been working with the HCRF in the

[1] As an ethnic minority group, the Garifuna have received substantial attention in the recent past from 'western' research organisations, but none of these other researchers actually stayed overnight in the communities.

CCMPA. It was necessary to understand the economic impacts that a newly imposed management plan was having on the affected communities, and to identify possible alternative livelihood options that could be initiated in each community. Therefore, the Opwall criteria for site selection were determined by an economic rationale for sustainable development. The final site selection was completed in 2006 during an eight week pilot field season, where I visited six different communities. Four main sites were chosen (Figure 2.1) providing comparisons between both mainland coastal (Rio Esteban, Nueva Armenia) and island (Chachahuate, East End) communities, and Municipal variations because they all belong to different Departments[2]. These sites provided a comparative analysis of the dependency of households on the marine resources of the CCMPA based on geographical spread and population density.

During the pilot phase I also visited another community within the area of the influence of the CCMPA called Sambo Creek. It was also traditionally a fishing community but in recent years has developed very high levels of tourism infrastructure. It was not considered to be a priority community by either Opwall or the HCRF, and therefore I was unable to take any students there or conduct any household surveys. Another Garifuna community, Guadelupe, was selected as a possible control site which was located outside the area of influence of the CCMPA[3]. However, this community was not included in the final research design because it provided no insightful data for fisheries management (predominantly an agricultural community) and had no tourism development to provide a comparison for alternative livelihoods options.

Four selection criteria were used to identify the three study sites. First, my safety and that of the student researchers was of paramount importance. In 2006, only two communities had reception for mobile telephones, and these were also within a short drive of the city of La Ceiba in case of an emergency. The other four communities visited were remote and we were entirely dependent on the radio in each community used by the Head of the fishing group for contact with Opwall. I will discuss safety issues in the next paragraph in further detail. The safety precautions necessary with being responsible for students in the field meant that the communities where I would spend

[2] There are 18 Departments (counties) in Honduras. Rio Esteban is in the Department of Colon, Nueva Armenia is in the Department of Atlantida, Chachahuate and East End are in the Department de Islas de la Bahia (Bay Islands) as part of the Cayos Cochinos.

[3] Guadelupe is located on the north coast in the Department of Colon, accessible only by boat from Rio Esteban. The boat journey takes over one hour.

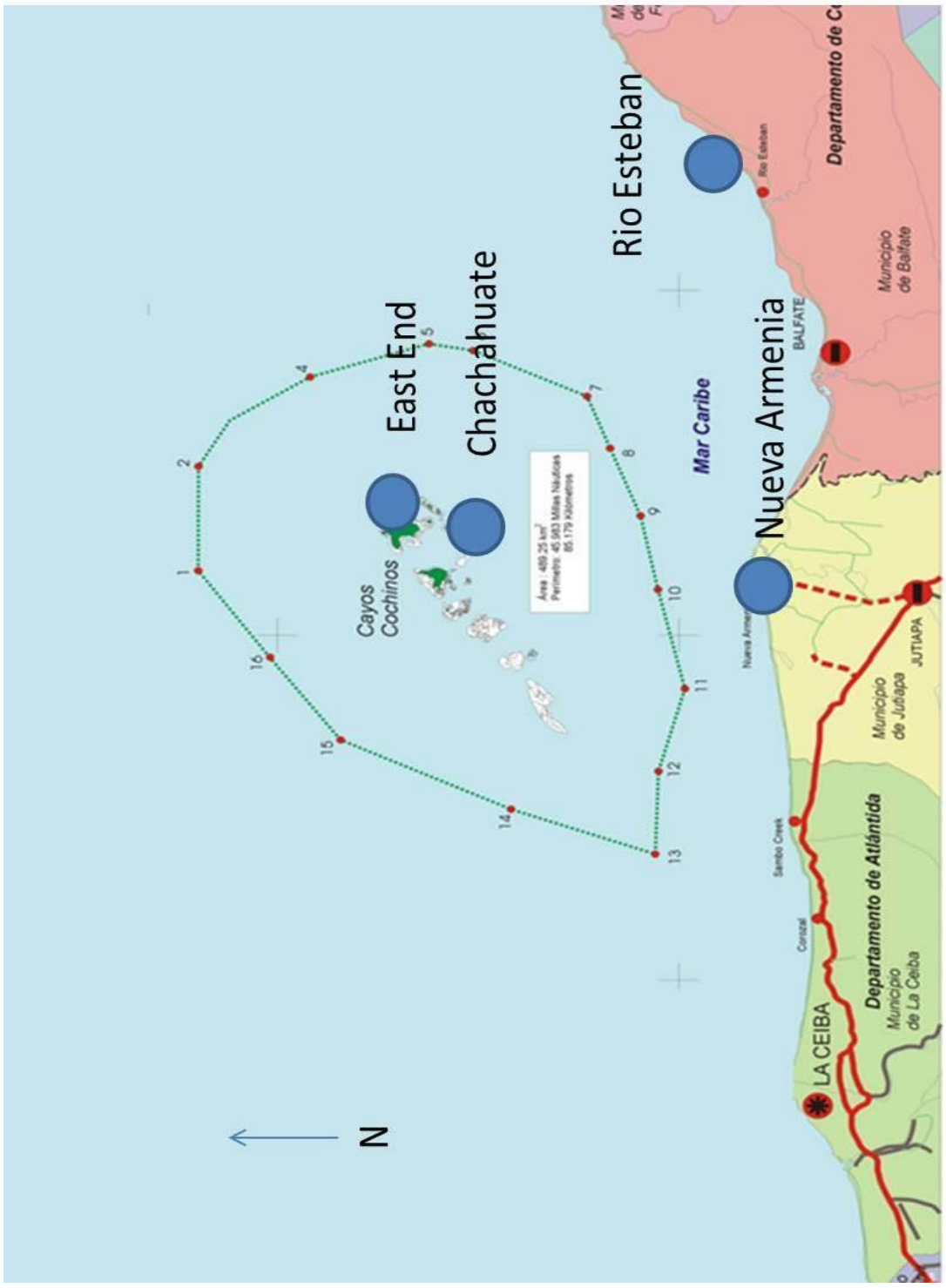

Figure 2.1: Map of the CCMPA and four community sites (Source: CCMPA management plan 2004-2008).

time with the students had to be accessible in an emergency under the Opwall safety procedures. The relationships already established between the HCRF and individuals in each community were considered to be the best option for Opwall emergency protocol. Second, my main research criteria were to select sites that differed significantly in fishing dependency, fishing effort and community level involvement with the HCRF to allow for a comparative analysis of the ability of these communities to be included in the management of the CCMPA. It was also important to select communities with different livelihood strategies to demonstrate the effectiveness of an ACM regime for managing the CCMPA within the context of these user groups. Third, the HCRF, working with Opwall, had identified the communities that they felt were necessary to be included in a socio-economic analysis. These were the two island communities inside the CCMPA which would be directly affected by fishing regulations, and also coastal communities where it was felt that they had good relationships with the fishing groups. Fourth, I had to consider the CASE partner requirements as discussed above to ensure that their research needs would be met. Therefore the sites selected reflect a strong bias for the preferences of both Opwall and the HCRF.

The most important of these site selection criteria was the first – safety – which warrants further elaboration. Site selection was also based on the necessary safety precautions for working in Honduras. Nueva Armenia and Sambo Creek were sufficiently close to La Ceiba to have reception for mobile phones, and within an hour's drive of the city medical facilities. However, Rio Esteban was a three hour drive from La Ceiba and out of mobile phone reception[4]. There was only one radio in each community located in the home of the Head of the fishers group, making us entirely dependent on this individual for contact with both Opwall and the HCRF. This also emphasised the connection between ourselves and the HCRF, as we were often seen as 'guests' of these fishers in the community. Transport to and from the communities was via the public bus system, but these journeys were restricted to a few times a day, with no form of public transport available at night.

In Chachahuate and East End, our emergency procedures were incorporated into the research station protocol on Cayo Menor, where a medic was available at all times, and the Head of the fishers group would provide transport to Cayo Menor if it was necessary. However, in a severe

[4] Since 2006 reception has improved permitting the use of mobile phones.

emergency a helicopter evacuation would be coordinated with the HCRF. Although extreme, these measures were necessary because of the lack of facilities on the island and the long journey by boat to La Ceiba (27km).

It was also necessary to consider the safety of (female) students working in these communities. The Garifuna men themselves were highly respectful, making no lewd comments or gestures towards us. However travelling on public transport always drew attention from Mestizo males in or around La Ceiba. I therefore felt it necessary to advise the female students to bring less revealing clothes for their fieldwork to reduce the incidence of male attention. This had only limited however success as it is an engrained part of the culture in Honduras for men to objectify women, not just foreigners.

During the phases where I was collecting data on my own outside of the Opwall season, I never resided in the communities but travelled to each location from La Ceiba with a translator. This was primarily due to budgetary constraints rather than safety concerns because I would not have afforded translator services as well as lodgings. To conduct the pilot surveys I used translators whom I knew either through GAD (who coordinate Opwall logistics) or my own contacts. Therefore I was always with someone who knew the area better than me, and more importantly someone that I trusted. I also used these same translators in La Ceiba, where it was quite important to be 'street savvy' and aware of the different strongholds of gangs that are still prevalent in Honduras. I also stayed in hotels that were in 'safe' areas of the city, with 24 hour security to ensure I limited any possible safety issues.

2.4.2. Description of the CCMPA case study and community sites

Having described the community selection criteria, I will now describe the location and natural resources of the CCMPA, and the three study sites in detail to account for the geographic, demographic and social differences and similarities between the sites.

2.4.2.1. Rio Esteban (RE)

Rio Esteban (photograph 2.1) is the community furthest away from La Ceiba and the CCMPA. The community has an estimated 630 households and 2800 residents[5] divided into different

[5] Estimate provided by Head of Patronato in 2006.

neighbourhoods including the 'colony', a distinct neighbourhood 30 minutes' walk outside of the main community. It is accessible by a gravel road off the main highway linking Trujillo with La Ceiba. The journey from La Ceiba takes approximately three hours and crosses the River Esteban. In the rainy season this road can become impassable due to flooding, cutting the community off to road access. Rio Esteban has one primary school, with older children attending the nearest high school in Balfate. There is a community hall which is used for Punta dancing competitions and for community meetings, and there is a small medical clinic which is only open three days a week. The community themselves pay for a Cuban doctor to run the clinic, covering his accommodation and food expenses. There is a running water supply which the community also pays for, although the pipes require substantial on-going repairs, and electricity is supplied and maintained by the Municipality of Balfate. A daily bus service to La Ceiba runs several times a day, although this service is restricted if the river floods. In 2007, the Municipality agreed to fund and build a bridge over the River Esteban, although at present this has still not been erected. The housing in Rio Esteban is of particularly high quality, made of cement and wood (evident in Photograph 1) with few houses built in a traditional Garifuna style. There are two hotels although both of these are now closed, and the cabins on the beachfront have been dismantled. The community has been built along the beachfront and parallel to the Esteban estuary, and the area is a natural mud flat supporting an extensive mangrove forest. This has an important ecological function as a nursery ground for many commercial reef fish species. There is substantial agricultural land surrounding the community, supporting both arable and dairy farming. Rio Esteban has the most mixed ethnicity of all the communities, with approximately 60% of the population from Garifuna descent and 40% of Mestizo (mixed race) origin. The predominant language used in this community is Spanish, although many of the Garifuna choose to speak in their native dialect amongst each other. This mixed ethnicity was reflected in the fishers groups, with no group excluding individuals on the basis of race and also in the traditional Garifuna Punta dancing groups, which include Mestizo dancers. The vast majority of residents in Rio Esteban are Roman Catholic, however other religions are practised and have places of worship in the community.

The livelihood structures of households in Rio Esteban are more dependent on agriculture than fishing because the community has a large expanse of land. The community used to produce coconut oil for export, but a disease decimated all coconut trees along the entire north coast in

the 1970s and this industry has never recovered. It has been replaced by fruit crops and dairy produce. Despite this agricultural land, there were more fishing groups in this community than any of the other case study sites. There were three groups operating in Rio Esteban, although two of the groups are presently trying to amalgamate. The main fishing activity was lobster diving, which was limited to a period of 6 months inside the CCMPA without the use of SCUBA equipment. There are some motorised boats in the community that were used for fishing at Roatan Banks, a fishing ground north of the CCMPA border. All fishing used a hook and hand-line, and an organised system for weighing and measuring the fish existed. The majority of fishers used Cayucos (canoe) with sail, limiting their effort to fishing grounds adjacent to or inside the CCMPA. Therefore smaller trading and a subsistence fishery dominated fishing activities within the community. The community is in the Department of Colon, and was therefore ineligible for funding through the MODAPESCA project that was available to those communities within the Department of Atlantida. This has contributed in the past to a poor relationship between these community fishers and the HCRF. Aside from traditional and subsistence activities, other livelihood options included cassava bread (sold to neighbouring communities and urban centres), teaching, bar ownership, pulperias (informal shops) and dependency on remittances sent by family members living outside the community. There has been limited tourism activity in the community but Rio Esteban has significant natural beauty, giving it potential for tourism development as an alternative livelihood.

Rio Esteban has a sister community - East End (Photograph 2.2) - a permanent dwelling on a tiny strip of beach on the east side of Cayo Mayor. Although it is the sister community, it has a distinct Patronato[6] and is considered to be in the Municipality of Roatan. The community consists of approximately 12 households with 45 residents. The community has piped water from a spring on the island and has electricity supplied by a diesel generator. The community is largely of Garifuna ethnicity, although there is some Mestizo influence reflecting the mixed mainland community. The livelihood structure of households in East End is entirely dependent on fishing and related activities, accessing grounds to the north of the CCMPA. However in 2009, two tourist cabins were constructed to provide an alternative livelihood for residents. East

[6] Community Council

End has a primary school for cayan children, and is the location of the Naval base which accommodates both Navy personnel and HCRF resource guards.

2.4.2.2. Nueva Armenia (NA)

Nueva Armenia (Photograph 2.3) is the community closest to La Ceiba, with approximately 500 households and 3000 inhabitants divided into five main neighbourhoods[7]. The journey from La Ceiba to Nueva Armenia takes approximately one hour via a frequent daily bus service. The community is now split by the River Aguan, which flows directly through the middle as a result of Hurricane Mitch which changed the course of the river (the old river bed is now the main access road into the community). There was a bridge across the river, although this has collapsed in recent floods and requires repair. The bridge served as the landing site for fishers in the community. There is one primary school which has been newly renovated, and older children attend high school in Jutiapa, a 15 minute bus ride from Nueva Armenia. There is a community centre where Punta dancing competitions are held, and also a weekly community discotheque. There is a medical centre in the community which is permanently staffed, and it has been a site for the placement of a Peace Corps volunteer for several years. There is a snooker hall and two hotels that are advertised on the main highway and in Honduras Tips[8]. The majority of housing in Nueva Armenia is made of cement and wood, however one whole neighbourhood nicknamed 'the new colony' was constructed with breeze blocks by an international aid organisation to re-house families after the devastation of Hurricane Mitch in 1998.

Nueva Armenia is predominantly Garifuna with over 80% of residents being of this ethnicity. The majority of residents speak both Garifuna and Spanish, and use both in conversation. The minority Mestizo residents are often referred to as 'cowboys' because they own large areas of agricultural and grazing land used for dairy. Non-Garifuna residents have been members of the Patronato in the past, therefore they are not excluded from community groups or local governance, though there was no Mestizo individuals in the fishers group of Nueva Armenia. The vast majority of the community members are Catholic, but there are places of worship for all other religions practised in the community.

[7] Estimate provided by Head of Patronato, 2006.
[8] A national tourism guide produced annually in La Ceiba which advertises all tourism facilities in the country.

The livelihood structure in Nueva Armenia was fishery dependent, with the majority of households engaged in some form of fishing related activity. However, there was only one fishing group in the community shared with Chachahuate. The majority of fishers in the community worked as individuals, although they assisted each other to land the catch and manoeuvre over the sand bar that protects the community from wave action. There were very few lobster divers in Nueva Armenia, but they had an area directly in front of the community specifically for them to free dive for lobster. All other fishing was by hook and hand-line. There are six motorised boats in this community, owned and operated by cooperative fishers through the MODAPESCA project. The boats enable these fishers to frequent Roatan Banks which is beyond the capacity of fishers using Cayucos with sails. They can also transport their catch more quickly to La Ceiba and the Bay Islands, acting as middlemen for other fishers in the community. The boats are also used under a tourism license to shuttle people out to the Cayos Cochinos and for day trips around the islands. Apart from dependency on fishing, Nueva Armenia has the highest number of other livelihood options including pulperias, bars, tourism, construction, and remittances.

2.4.2.3. Chachahuate (CHA)

Chachahuate (Photograph 2.4) is the sister community of Nueva Armenia, originally a temporary dwelling for fishers to rest overnight during fishing trips. The community is the largest of the fishing cays and the only cay to have permanent inhabitants. It lies between the two islands of the Cayos Cochinos (Cayo Mayor and Cayo Menor) with approximately 43 households and a maximum population of 300 during the fishing season[9]. During the winter months this population drops to around 90 inhabitants as fishers return to the mainland. Although it is the sister community to Nueva Armenia and shares a fishing group, it has an independent Patronato, and is within the Municipality of Roatan. The island has no running water making it entirely dependent on potable water and rainwater. There is no electricity although the community have a diesel generator which is run for two hours every night. The only way to access the community is by boat, therefore almost all households own either a Cayuco or motorised boat. There is now a kindergarten which was built by US AID in 2008, a restaurant and one single storey hotel funded by WWF and TNC. Children of this community attend the primary school on East End, before

[9] Estimate provided by Head of Patronato, 2006.

Photograph 2.1: The main street in Rio Esteban, illustrating cement and wood housing. Subset: high quality cement housing.

Photograph 2.2: Housing in East End, and jetty.

Photograph 2.3: Main road in Nueva Armenia showing the newly paved road surface.

Photograph 2.4: Traditional Garifuna wooden house in Chachahuate. Construction of a manaka roof in the foreground.

leaving the cay to live with relatives on the mainland to attend high school. The housing is the most traditional of all the communities, built from wood and manaka (thatch). The community is entirely Garifuna in ethnicity, although there are one or two Mestizo wives of fishermen who have moved into the community. Spanish and Garifuna are both spoken in Chachahuate, often interchanged within conversation. The community is largely Catholic and Evangelical, with a place of worship for each (two households which also act as churches).

The livelihood structures in Chachahuate are based on fishing and tourism. It is typical for households here to have both the mother and father working, as they do not receive remittances to the same extent as the coastal communities. The majority of fishing on Chachahuate was lobster diving, although a substantial portion of those divers now engage in hook and hand-line fishing. However, there remains a strong sense of animosity in this community towards the HCRF. Aside from fishing and tourism, there are very limited alternative options for livelihoods on the cay. Pulperias form an important source of income, but there are no other activities.

2.5. Data collection processes

This section will document the evolution of the mixed methods techniques that I have used, explaining how each one will contribute to answer my research questions. I will demonstrate where and when each method was implemented and who was involved at each stage. I have included a detailed section on the role of translators and Opwall students who were an integral part of this research. I will then discuss each of the techniques I have used to indicate the rationale for use, justification for use (with reference to previous studies), and how each fits in with the design principles of my mixed methods approach.

2.5.1. Evolution of the fieldwork

The fieldwork and mixed methods techniques that I have used in this thesis have evolved over the course of three years, revealing the deepening of my personal understanding about the local context of the CCMPA and how to practically use different techniques in the field. As explained in section 2, this evolutionary understanding has been reflected in the transition from a positivist fieldwork design to a critical realist perspective applying a mixed methods approach. The focal point of my research is to apply thematic and discourse analysis to the qualitative data collected using household surveys, interviews, focus groups and participant observation. I am also using quantitative analysis to support these findings.

My analytical approach will be discussed in detail in the next section. Although the data collected during 2006 was primarily quantitative in nature, there is sufficient detail in the contextual answers to allow me to re-analyse this data using the techniques mentioned above to be incorporated into a mixed methods analysis.

2.5.2. Timeline of the fieldwork process

Throughout the three years of fieldwork, I have spent a total of 12 months in Honduras. In each year I was involved with community members, HCRF staff, Opwall students and translators. The community members and HCRF form the platform of my thesis, providing evidence of the effectiveness of CM and ACM regimes from the perspectives of the managers and those being managed. In each year, other stakeholder groups have been interviewed to intersect these perspectives to create a more accurate assessment of management in this localised context. These additional stakeholders have provided important supportive evidence of the successes and shortcoming of management for the CCMPA. They include NGOs directly involved with the HCRF for conservation and the development of management plans for the CCMPA (WWF, TNC); government agencies responsible for protected areas (COHDEFOR, SERNA, DIGEPESCA), and tourism (Municipal Tourism Office); and community representation groups (ODECO, OFRANEH). Appendix 1 is a summary table of interview type, location and connection with research per year.

In my role for Opwall as the social science supervisor for the north coast, I spent between 8 and 10 weeks for each of three years working with overseas students in the Garifuna communities. During this time, all of my field costs were covered by the CASE partner (Opwall), including the use of translators. This enabled me to conduct household surveys to create a baseline of socio-economic data. Techniques used in the communities included household surveys, key informant interviews (Patronato members, group leaders, and tourism operators), historical timelines and participant observation. One week was always spent in La Ceiba each year to allow the students to perform their own key informant interviews with targeted individuals from the HCRF, government agencies and tourism-related organisations. During the additional six weeks that I was in Honduras outside of this Opwall season, I would conduct my own key informant interviews with the organisations mentioned above, spending on average two weeks on Utila and four weeks in La Ceiba. Appendix 2 is a summary Gantt chart of all research periods.

2.5.3. The role of translators

Translators played a critical role in the data collection for my thesis, acting not only for translation purposes but as gatekeepers, chaperones, guides to both myself and the students. The

roles, gender, age, ethnicity and education of the translators will be discussed in detail below. All of the interviews were conducted in Spanish because some respondents in the communities were not of Garifuna ethnicity. This would also provide consistency with the key informant interviews conducted with organisations in La Ceiba, because all of these (except ODECO and OFRANEH) spoke only English. Several key informants were fluent in English (HCRF, WWF) and in these cases interviews were carried out without a translator. Throughout the four years of research, my own understanding of Spanish has improved significantly, allowing me to self-translate the vast majority of my interviews, thereby reducing the filtration of the response through translation. However, in 2006 and 2007 I am aware that I was more reliant on the translators, which led to inevitable filtering of the answers dependent on the translator's ability to remember long pieces of dialogue.

In 2009 when I felt that my Spanish comprehension was much improved, I still persisted in using a translator for all of my interviews to ensure standardisation of questioning. This allowed me to write answers down and think about potential related questions that would not have been possible had I been concentrating on phrasing questions in Spanish. I also felt that the interviewee was more comfortable talking through a translator, and used more colloquial language than in situations where I conducted a one-on-one interview in English. This allowed for a more conversational approach to the interview style which suited the more informal Honduran manner. I was also able to conduct household surveys quickly because I could understand all of the responses without needing translation. Similarly with key informant interviews, I still used a translator in order to ask the questions in a consistent style, but more importantly because they could relate far more easily to the respondents than me as a 'foreigner'. This proved to be important for all the household surveys conducted when asking questions concerning the household livelihood and income structure. The translators were able to reassure respondents that this information would not be given to either leaders in the community or the HCRF, or used against them. At times it was necessary to show the respondent the template survey where I was writing down answers to prove there was no hidden agenda.

Key informant interviews were also recorded on a Dictaphone where permission was granted, which provided both the Spanish response and English translation for detailed transcription of the interview. Household surveys and fishers focus groups were not recorded because the

responses were less in-depth and could be written down without losing any of the detail. These interviews were also conducted either inside a home or in a communal area with high levels of background noise disturbance unsuitable for recording.

In 2006, the case partner decided to use local Garifuna translators in each community. Only two translators were available to us in any one community (six in total), making the ratio two translators to five researchers. Although in theory this would benefit those individuals in the communities economically, in practice using local translators presented multiple problems. First, the individuals used as translators were selected on our behalf by a local NGO, who were relying on community recommendations. As a result five of the translators were male, aged between 22 and 36, and all had at some time tried to emigrate illegally to the US. The only female translator was aged 22 and was supporting a baby, but also had a drug addiction which made her quite erratic and unpredictable at times. None of the translators had a sufficient level of written or spoken English to understand or translate the interview questions. This resulted in poor understanding of the wording and meaning of the interview questions.

Second, by using members of the community there was a distinct difference in the level of enthusiasm for the work between themselves and us as researchers. The laid-back nature of the Garifuna meant that only one or two interviews would be conducted per day, with the time in-between interviews spent chatting to other community members, or engaging in other activities.

Third, the translators would not directly translate the majority of answers given by a respondent, instead offering their own opinions which heavily biased responses, often saying ‘she means to say this’ or ‘she doesn’t understand but this is what she knows’. These translators would also summarise a long answer into one or two words, losing all of the richness and detail of a response.

Fourth, community members were often wary about answering questions concerning both their understanding of community management and household economic details. Compared to the interviews after 2006, using non-community members as translators, it is clear that during the initial pilot stage respondents did not feel comfortable revealing these more sensitive details to another member of the community who was not a trusted friend or family member.

Fifth, because the translators lived in the community they spent no further time with us beyond the time spent interviewing, making our assimilation into the community difficult. At this time in 2006, there was no community tourism liaison who could speak English to introduce us to other members of the community, thus interaction in the community was limited to the host family in the homestay.

To try and improve the data collection during 2006, four Peace Corps[10] volunteers acted as translators in La Ceiba, Chachahuate and Guadelupe. There was then a distinct difference in the level of detail in the answers collected, and also in the quantity of interviews conducted. Therefore I discussed the importance of using non-community translators with the Opwall, my CASE partner, and it was agreed to use students from C.U.R.L.A University in La Ceiba for the 2007 field season. In 2007 three male students from C.U.R.L.A University were selected as translators. They were all aged between 22 and 26, and were recommended by their course director for their level of English and diligent work ethic. It was also considered an advantage to have male translators because I was to have five female students through Opwall. As males they would provide a certain level of safety as chaperones to the students, and also balance the group dynamics. I spent time before the start of the research period with the translators, ensuring that each understood both the wording and the meaning of the questions before creating a Spanish version of the interviews for their use. Before conducting any interviews, I then asked the translators and students to do practice interviews with myself to standardise the phrasing of the questions. During interviews the translators would ask the respondents questions in Spanish, and then translate the answer to either myself or a student who would write the answers on a template. By using the same translators in each location in 2007 they became very familiar with the questions and format of an interview, which allowed them to become more confident at pushing the respondent for an answer and were more able to re-phrase questions to allow respondents to understand the question. The translators were studying ecotourism at the local university giving them both an interest and enthusiasm in the work, and helping to reduce 'translator fatigue'. Although the translators were of Mestizo origin they were received well in all communities, and enabled my group to interact with the locals beyond our host family through games of football and drinking in the local bars. Interestingly, the translators responded

[10] An American volunteer program run by the United States Government to provide technical assistance for social and economic development of both developed and developing countries.

to me as a figure of authority, referring to me as their 'boss'. They viewed their working time with us as an important element of their degree course and were keen for me to be able to demonstrate a good opinion of them to their course director.

A key role played by the translators in 2007 was to arrange key informant interviews in each community and in La Ceiba. These arrangements were made in the community without me being present which was preferred by the translators. They believed it would be better to explain what we were aiming to achieve without me being seen to avoid prejudice towards my age or gender. In Honduras my position as the group supervisor was translated as a 'profesora' which is a standard teacher under the American education system, yet I was considered too young to be of this position. Although the community members were familiar with me from having been in the field in 2006, during that year Dr. Keri Brondo (who is married with children) performed this profesora role. This approach proved to be successful and the majority of key informants were very forthcoming in arranging to be interviewed.

In 2009, finding consistent translators was a difficult problem. Similar to 2007, students from C.U.R.L.A University were used for this function but as a result of the on-going political tensions in the country throughout May and June, the university had been on strike for several weeks and exams had been cancelled. This meant that the students were all taking exams at different times throughout summer, and unable to remain with us for the duration of the research period. In the first two weeks, one male and one female translator stayed with us and preparation followed the same format as 2007. After the first week it became apparent that the male translator did not understand the questions and was having difficulties with the interviews, so I decided to try a different translator to improve the quality of the data collection. During the next four weeks it was possible to use a female American student who was volunteering for GAD, with a sufficiently fluent level of Spanish to conduct the interviews. It was very helpful to have a native English speaker working alongside the Honduran students because they were able to improve the Spanish wording of the questions to reflect more of the meaning of the questions. However, the American translator was uncomfortable with the ethics of asking household economic questions, feeling that this was intrusive and rude, and she also tired very easily and suffered from interview fatigue. The original female C.U.R.L.A student proved to be very diligent in her level of work, but suffered from severe night terrors which affected the amount of

sleep she had thus making her extremely tired most days. These episodes also began to alienate her from the students who found her increasingly difficult to work with.

In Nueva Armenia we enlisted the help of two female Peace Corps volunteers, one who was living in the community itself and one from the neighbouring town of Jutiapa. Unfortunately both of these translators were too close to the community members resulting in bias towards their own opinions. In Chachahuate, East End and La Ceiba, another female Peace Corps volunteer was used along with the American student and the C.U.R.L.A student. She was fully bilingual and provided renewed enthusiasm for the interviews. I conducted all of my remaining key informant and fishers interviews with her for consistency of the translation and understanding of the questions.

The key informant interviews that I conducted outside of the Opwall season were with bilingual translators that were either friends or recommended through contacts. These translators were paid by the day and conducted two interviews per day. I used one individual for all the interviews in 2007 and another individual for all of the interviews in 2009. This ensured that I was able to explain the precise meaning and importance of the interview questions, and could ask responsive questions during the interviews without misinterpretation. I recorded all of the key informant interviews when permitted and also wrote answers in English. I also used the same translator to pilot the household survey and fisher's individual interviews in Sambo Creek and Corozal.

2.5.4. The role of Operation Wallacea overseas students

Working with students through Operation Wallacea has been an integral part of my research approach and design from the start. In total I have supervised 15 undergraduate and postgraduate students from the UK, Canada and USA studying for sociology, geography, tourism management and economics degrees. In order to manage these wide ranging disciplines and associated research approaches, I had to combine all student projects with my own in a complementary manner to standardise the data collection procedures to maximise the reliability of the data. I also felt it was important to incorporate all individual student questions into one combined survey to reduce the fatigue placed on respondents in each community. The baseline socio-economic and livelihoods data requirements for each student were relatively similar to each other and to mine,

and this was collected through the use of the household survey. The individual student projects were mainly focused on tourism developments as an alternative livelihood option, taking into consideration the levels of tourism development, perceptions of sustainability, perceptions of tourists and capacity to manage tourism facilities. In 2009, two students focused on investigating how social capital influences success of cooperatives in the communities, with regard to the potential implementation of the Wildlife Conservation Product (WCP) scheme currently applied in communities in Cusuco National Park. These two divergent research strands have important application to my research questions and enabled me to further explore the importance of social capital, trust and capacity within the communities for local user groups to participate in decision-making for the CCMPA. In my role as supervisor I was able to develop the specific key informant interview questions for each area of research with the students, applying a level of control over the projects in conjunction with their university supervisors. Therefore I have managed multiple research projects within the design of my own research.

In order to standardise the administration of the household surveys, I held practice interviews with students and translators in each year. This was to ensure that questions were understood by all, and asked in as similar a way as possible but there was inherent variation within and between each group of students and translators. I found that the interviews conducted by students at the beginning of each research period were longer and more detailed because of unfamiliarity with the process. After a few days the students gained in confidence and became more adept at categorising responses. I chose to quantify many of the answers associated with the household survey into categories and codes in order to make the process easier and more understandable for both the students and translators, and to account for inevitable differences in the level of data recording between the students. Their data recording efficiency was affected by their degree disciplines, their experience of conducting fieldwork, and their personalities. Towards the end of each research fieldwork period, the students inevitably became fatigued with the format of household surveys, at which point using categorised responses improved data collection because the students were required to only record specific data.

I found that working with the students was at times highly stressful, as I was solely responsible for the group 24/7 as the only Opwall member of staff present. It was also very stressful to direct and develop multiple research projects at the same time as managing my own data collection.

However, the benefits outweighed the problems because of the additional data I was able to collect, and more importantly, because of the much greater enjoyment I had during the fieldwork process and the enhanced skills I have developed as a supervisor (which was a huge learning curve!). I also found that it was important to be able to converse with people from a similar background to myself in order to combat the cultural shock that I experienced.

2.5.5. Fieldwork design principles and site analysis

It was not possible to have an accurate total population in each community from which to generate a target number of interviews in any community because the last available population register for all communities was a national census completed in 2001. Since 2001, all communities have acquired more housing and the estimated population sizes have increased. In addition, the population of these communities is complicated by the high level of seasonal fluctuation of residents. For example, many fishers go offshore for several months at a time, or spend considerable periods of time in a sister fishing cay community where most fishers have a second family and household who are permanent residents of that cay. Therefore during the summer months the population of the coastal communities reduces, and the population of the cay communities increases. However, accounting for these seasonal fluctuations, the populations of Chachahuate and East End have not changed significantly since the 2001 census because they have natural restrictions created by the limited availability of land for a residence. Therefore I created a sampling frame using the estimates provided by the Patronato.

In the two coastal communities it was possible to identify different neighbourhoods (barrios) within each community, and then devise a systematic sampling strategy to target a proportionate number of households within each barrio to provide a representative sample based on the total population estimate. This strategy is accepted as a standard method for generating a sample size by dividing the total community population by the sample size (Cinner *et al*, 2010; de Vaus, 2001; Teddlie and Tashakkori, 2009). Within each neighbourhood every 5^{th} household was sampled until the target was reached. This sampling strategy was only applied to the household surveys in order to produce quantitative results to generate a socio-economic profile of each community. Using systematic sampling, the target number of households to survey was 50 in Rio Esteban and Nueva Armenia because they have similar estimated population sizes. This translated into 10 household surveys to be conducted in each neighbourhood. I also wanted to

survey across the whole community to discern the livelihood strategies of all households, and to investigate whether proximity to either marine or terrestrial resources influenced this strategy. In Chachahuate and East End, this sampling strategy was not applicable because of the small size and transient nature of the populations. In these locations between 10 and 20 household surveys were conducted to generate a representative sample of the communities. Households were selected based on the availability of heads of households during the time we were staying in the community.

In the coastal communities, the neighbourhoods (shown to me on a walking tour of each community with my host family) were separated by footpaths and gravel roads making each one distinctive. These neighbourhoods are only recognised at the community-level and are not shown on formal maps. As a group, the students and I made hand-drawn maps of each community to familiarise ourselves with the neighbourhood boundaries, and to provide a reference for marking the locations of household surveys. Chachahuate and East End have no distinct neighbourhoods due to the relatively small size of the available space (erected around a central cooking area), but a community map was still produced to locate the households interviewed.

To interview fishers I held focus groups with 6-8 individuals in each community in 2006 and 2007, and I individually interviewed fishers in each community in 2009. I aimed to interview an equal number of fishers in cooperatives (n=4) and individual fishers (n=4) from each community to provide a balanced approach to my research design. Although household surveys followed a random sampling design, due to the small sample sizes available of fishers this design needed to be supplemented by non-random methods, mainly convenience sampling.

2.5.6. Sampling bias

In 2006 and 2007 when I held focus groups with cooperative fishers in each community, the participants were selected on my behalf by the leaders of the fishing cooperatives who were also acting as our community liaisons. This automatically placed these fishers in positions as gatekeepers to the other fishers in the community.

Although the household surveys followed a systematic sampling strategy and subsequent selection of every 5th household, this was not always possible because some households refused to participate in the survey or the head of the household or a suitable adult was present to

interview. If host families contained a member of the Patronato, a fisher, a group leader or someone involved in tourism, these individuals were interviewed as a key informant by the relevant student or me.

2.5.7. Managing respondent expectations

Community members who were respondents of the household survey were generally willing to participate in the survey, for no reward other than being allowed to voice their opinions. However, some individuals expected to receive monetary payments or alcohol in exchange for participating. This sort of expectation is the result of some individual entrepreneurial confidence, but also because other research groups have conducted interviews in these communities in exchange for payments. Many different researchers have visited the communities for short periods of time, and use money as a means of achieving their desired interview targets. This was a problem in 2006 when an American research group came to Rio Esteban for two days, coinciding with the presence of my group, and paid one of our translators $10 per interview as an incentive to conduct up to ten interviews a day. After working with this group for two days, the translator did return to work with my group but asked for higher pay!

To manage the expectations of the communities towards the potential outcomes of my research, I repeatedly clarified that my findings would be documented as a report to the HCRF, and that I would include the perceptions and opinions of the different communities. However, I also stated that I did not have any authority over the subsequent use of that information, and could make no promises of changing conditions for the communities.

2.6. Data collection techniques

2.6.1. Site mapping

In order to familiarise the students and me with the communities, I would always perform a walking tour of each community with my host family and draw a rudimentary map. I would ask them to point out important places in the community including churches, community halls, clinics, schools and houses of members of the Patronato. The locations of household surveys would then be marked onto these maps to both facilitate and monitor the progress of the research, and to provide supportive documentation for analysis. In addition to the walking tour

maps, in 2009 it was possible to use Google Earth maps of Rio Esteban and Nueva Armenia which provided an accurate spatial reference for household survey locations. It also provides visual evidence of the different neighbourhoods within these communities. Chachahuate was not covered by the Google Earth satellite imaging system.

2.6.2. Household surveys

The pilot household survey in 2006 was devised primarily to generate background information on resource dependency, livelihood structure and knowledge of the management of the CCMPA. There was no socio-economic data collected at this stage, but the analysis in 2006 was used to provide direction for the subsequent research design. The survey was divided into sections covering basic demographics, socio-economic data and expenditures, and livelihood strategies to provide baseline socio-economic data. In 2007, the focus of the research was on community knowledge of natural resources, community level participation with management, participation in community meetings and the communication networks within and between communities and organisations. A combination of open-ended and closed questions was used in each section, with some Likert scale rapid response questions used to ascertain attitudes towards tourism. Between 2007 and 2009 the management plan for the CCMPA was revised, providing evidence of community participation with management. This allowed the focus in 2009 to concentrate on social capital, trust, cooperation and participation at the community level, to understand levels of motivation for natural resource management and tourism development (Appendix 3). The questions were devised using indicators developed and applied in other case studies to answer similar socio-economic and livelihoods questions (Bunce and Pomeroy, 2003; Cinner *et al*, 2005a; Crona and Bodin, 2006; Bene *et al*, 2007). Indicators for social capital and trust were taken from Crona and Bodin (2006) and customised to suit my own research needs and local context.

The head of each household was interviewed, and if they were not available arrangements were made to interview the household at a later time. If the head of the household was still not available, another adult living in the household was interviewed. Between 30 and 50 surveys were conducted in both Rio Esteban and Nueva Armenia in 2007 and 2009, the number being affected by translator availability, speed of the interviews and weather extremes preventing travel to study sites (including hurricane threats and evacuation). Between 10 and 20 surveys

were conducted in Chachahuate, dependent on the number of available respondents in the community at the time of sampling and translator availability. Although interviews were designed to be relatively brief, taking under 30 minutes to complete, the majority of interviews lasted between 45 and 60 minutes because respondents often enjoyed the interviews and gave elaborate answers to open-ended questions.

The number of interviews collected each year allow for a deductive quantitative analysis recognising the inherent non-parametric spread of the data sets across the two different years. Therefore, my aim with the analysis was to develop thematic conclusions at the community level. Different households were sampled each year because they were sufficiently representative of typical households in each community.

2.6.3. Fishers focus groups

I held focus groups with fishers in each community in both 2006 and 2007. As the main user group of the marine resources in the CCMPA, focus groups were used to understand the attitudes and experiences of fishers during the first CM management cycle, and enabled me to collect information from several people in a short period of time. I also wanted to understand the interactions between members of fishing groups and individual fishers with each other and the HCRF to evaluate the effectiveness of participation with management of the CCMPA. Therefore as described by both Morgan and Spanish (1984) and Teddlie and Tashakkori (2009), a focus group can serve as both an in-depth group interviewing technique and an observational technique of interactions.

Focus groups were conducted with between 6 and 8 respondents and held in a location specified by the fishers. Cooperative focus groups were always held at a fisher's residence, whereas individual fisher focus groups were always held in a communal location, i.e., a landing site. The public nature of the individual fisher focus groups meant that other individuals (some fishers) would often join in the discussion at certain points, and some of the core respondents would leave for short periods to have conversations with passers-by. Focus groups were never mixed between cooperative members and individual fishers to avoid conflicts or respondent dominance (Krueger and Casey, 2000). The questions used in the focus groups were open-ended to generate narrative data. As with the household surveys, the focus group surveys were divided into

sections, starting with basic demographic and livelihood information, before progressing to the more focused questions concerning perceptions of management and interactions with the HCRF. This order was deliberately chosen to allow me to gather as much information as possible before the questions that I knew would create 'explosive' discussions (relationship with HCRF, benefits and disadvantages of the management plan). I use the word explosive here because tensions between fishers and the HCRF were very high at this time and these questions generated very angry responses from the fishers. Quite often feelings of anger were so strong that the fishers would stand up, gesticulate and shout whilst making their point. I also used the sessions to see what issues were talked about between these individuals, asking respondents what they considered important about fishing or if there was anything they wanted to discuss. Maps of fishing grounds were created by the fishers themselves in place of the HCRF maps available (Appendices 4 and 5). This was the preference of the fishers partaking in the focus group because they visualised the fishing grounds using on visual landmarks as opposed to CCMPA boundaries or bathymetric charts.

The sessions typically lasted for around 3 hours, although two focus groups were held over the course of two consecutive evenings for a total of 6 hours each. I asked all available translators to attend these to facilitate the sessions and record responses. In both years, certain individuals sometimes dominated the group preventing others from stating a different opinion. This occurred more frequently in the focus groups with cooperative fishers, where the head of the group would often speak on behalf of everyone.

To standardise the focus group as best as possible, I went through all the questions beforehand to ensure the translators understood the context of the questions, and then prepared a Spanish version of the questions for use during the actual sessions. One translator would then lead the focus group with me acting as facilitator, and the other would explain the different responses to the students who would create written records. This allowed me to interact within the group discussion and record observations (although I also wrote notes of responses), and freed the translators from having to write in English. This process enabled more detail to be captured in the oral translations rather than be lost in a written form. The same questions were asked in each community each year to evaluate the similarities and differences between fishers' perceptions in each community. Additional questions were asked in 2007 to better understand fishing

dependency, perceptions of successes and failures of management, and relationships with the HCRF. These focus groups yielded better information and were more enjoyable for myself and the participants because I was more able to facilitate the sessions than in the previous year.

Having used this technique in 2006, in 2007 I removed the more sensitive questions concerning issues of trust, compliance with regulations and illegal fishing activity from the focus group questions and instead conducted small individual interviews with each fisher at the end of the session. This was because in 2006 few fishers felt comfortable offering an opinion on these topics in front of the rest of the group. This is typical of Garifuna communities, where trust appears to be limited only to members of the family. I was surprised by the high level of individual's responses to these questions, which validated this change of tactic.

2.6.4. Individual fisher interviews

After analysing the results from the focus groups help in 2006 and 2007, I felt that the focus groups were overly dominated by certain individuals who were generating a biased interpretation of fishers' perceptions of management. Therefore in 2009 I conducted individual interviews with fishers in place of focus groups to gain a deeper understanding of personal perceptions, and to look at the correlation between individual and group perceptions and see whether the focus group bias was widely shared. I also wanted to ask more targeted questions to understand historical fishery dependency and current fishing grounds to determine if the dependency on resources within the CCMPA has changed as a result of management regulations, and perceptions about the management revision meetings and subsequent ACM-based management plan.

I used standardised open-ended interviews where the wording and sequence of the questions was determined in advance (Patton, 2002), and in this way all fishers were asked the same questions in the same order. The open questions allowed respondents to express their opinions and perceptions in their own terms instead of pre-defined categories. The interviews were conducted using one translator, and allowed me the opportunity to ask for clarification or further explanation of answers. Interviews were all conducted in Spanish and I recorded the responses in written form as none of the fishers wished to be recorded. The interviews with fishers from cooperatives were all conducted in their residences, and individual fisher interviews were all conducted at landing sites.

I conducted between 4 and 8 interviews in each location, aiming to achieve a balance between group and individual fishers. There were no fishers present in East End at the time of my visit therefore no interviews were conducted in this community. I only interviewed group fishers in Rio Esteban because of the limited availability of translators. Interviews typically lasted for an hour and were mostly conducted in the fishers' residences between 4pm and 8pm when respondents were available. These interviews often yielded highly detailed information about fishing effort and their opinions about both the management process and outcomes. Although these interviews provided rich qualitative data for thematic and discourse analysis, and enabled me to draw comparisons between the 'group' opinion and 'individual' opinion, it may have been better to conduct further focus groups in 2009 for more direct comparison with the responses from the previous two field seasons. I could have used the focus group format to examine the changes in perceptions of groups and individuals in response to the alterations in management introduced in 2008. However, fishing groups in Rio Esteban were in a transition phase to amalgamate during the 2009 field season, which would have potentially biased focus groups and provided more observation of interactions than perceptions data. I was able to make these observations anyway using non-participant observation as described below.

2.6.5. Participant and non-participant observation

I used participant observation in two main ways throughout the research period: as an observer of interactions between different stakeholders and as a participant within the management revision process. As an observer, I kept a field diary of my daily encounters with people in the communities to contextualise life for the Garifuna in a narrative form. I also made notes on the interactions between the Opwall students and the communities, to understand their perceptions towards us and the research. I was also a non-participant observer of different meetings held over the three years. These included meetings between fishing groups, within fishing groups and between fishers and the HCRF.

As an observer-participant described by Patton (2002), I contributed to the management revision process as an 'expert' social scientist, placing me into the category of dominant educated elites. The meetings were held over the course of four months using stakeholder participation techniques to discuss conservation problems and to generate potential solutions. Participants were mixed (scientists, managers, government agencies and communities) which allowed me to

make detailed unstructured observations of the interactions between individuals within these groups. I was not always able to participant fully in the discussions because the Spanish conversation was too rapid for me to follow. However, it enabled me to observe the other participants, and these observations form the crux of my analysis of the effectiveness of the process of ACM, and are discussed in detail in Chapter 5 section 5.2.

2.6.6. Key informant interviews

Key informant (KI) interviews were conducted with individuals from organisations and institutions involved in the CCMPA governance structure. Where possible I interviewed two individuals from each organisation to increase the reliability of the data and used a semi-structured format in a standardised interview (Patton, 2002; Teddlie and Tashakkoir, 2009) asking the same questions in the same order to all respondents. I also asked additional questions to gather further detail if an answer illuminated a point of interest or importance, therefore mixing the semi-structured format with informal conversational techniques. In some interviews certain sections were irrelevant to the respondent and were not asked. The central aim of the key informant interviews was to find out about the participation of an individual/organisation with the management process for the CCMPA, and their perceptions on the effectiveness of the CM and ACM management models. Specific questions were asked about trust between stakeholders and trust of the ACM process, in order to investigate the power relations between stakeholders. Additional questions were asked about the mechanisms for feedback to the HCRF and considerations for improvements to the process. It has been possible to interview the same individuals in the NGOs (except TNC) involved in the management of the CCMPA in successive years but this was not possible for government agency interviews because of personnel changes (commonplace in Honduras).

Interviews were conducted using a translator in the majority of cases as described in the section 2.5.3. Some individuals spoke fluent English so these interviews were conducted without a translator present. All key informants gave their permission to be recorded, allowing me time to listen to responses and interject relevant questions into the pre-written questions where appropriate, and I would often also write responses down as a back-up to the recording. Interviews with key informants typically lasted between one and two hours depending on the respondent's availability, and the length of responses given to open-ended questions. All

interviews were conducted at the respondent's place of work and all key informants indicated when their answers were personal or institutional opinions.

2.6.7. Secondary data

The use of secondary data illustrates the collaborative nature of my thesis, working directly with Opwall and indirectly with the HCRF. I was able to make use of fish catch and landings data for two communities in 2007 collected by the HCRF, and this data has been used in an economic analysis of the dependency of these communities on resources within the CCMPA as presented in Chapter 4. The two management plans produced by the HCRF for the CCMPA (2004-2008; 2008-2013) have also been critical to my research by outlining the conservation and sustainable development objectives for the CCMPA, and provided the basis of all my research questions. I have translated the relevant sections of both management plans for personal use and have also made extensive use of available online information of government conservation, fisheries and tourism policies. Online news sites have also provided regular updates in general and in particular regarding the political stability of Honduras following the military coup in June 2009.

2.7. Data analysis procedures

Adopting a mixed methods approach incorporating both qualitative and quantitative social science techniques has meant that different epistemological approaches and therefore different types of analysis were required. The stages of analysis and different approaches will be described below, including an explanation of where the analysis has been used in this thesis.

2.7.1. Stages of analysis

During the research period of this thesis, I have undergone systematic decision-making stages/processes for analysis of the data. These stages included creating an Excel database for the quantitative household survey data; creating an NVivo database for the qualitative interview data; familiarisation with the data collected; preliminary analysis for deductive and emergent themes in the data that can be systematically organised; validation of analysis; recording of recurring themes within specific data types and across data sets; revisiting the analyses; an investigation of new themes; and providing evidential conclusions of the theory and conceptual reasoning applied to this case study. These processes reflect how my understanding of the local

situation has improved over time, and how my application of field techniques has changed in response to this sequential understanding.

2.7.2. Quantitative analysis

Quantitative analysis has primarily been applied to household survey data which was subjected to categorisation and coding. The codes were used to rank household economics, socio-economic characteristics of households and communities (Cinner *et al*, 2005a), and livelihoods strategies (Bene *et al*, 2009). Quantitative analysis in this thesis follows a hypothetico-deductive model, providing statements of hypotheses based on past experience and the deduction of observable consequences that must occur if hypothesis is true. In this way, hypotheses have been tested by collecting new data in the format of a household survey. Statistical analyses have then been performed using SPSS to check for significance between respondent groups and different year groups (standard deviation, correlation, t-test, Kruskal-Wallis ANOVA).

2.7.3. Economics of fishing

In order to evaluate the importance of marine resources of the CCMPA to the livelihoods of the Garifuna communities, it is necessary to analyse the economics of artisanal fishing in CCMPA. This was done by combining fishery data collected by the HCRF in 2007 with the empirical perceptions data of fishing effort and catch data that I collected in the same communities over the same timescale (Nueva Armenia and Chachahuate). The fishery report documents the size, weight and length of species caught per community over a six week period. The report focuses its attention on Nueva Armenia and Chachahuate, considered as the two main fishing communities by the HCRF. It was possible to extrapolate information per species and combine it with perceptions data collected from the fishers surveys. In this way, the amount of fish of each target species caught was combined with qualitative fishing effort and value data. Therefore, an economic value could be generated per community for fishing grounds inside and outside the CCMPA based on frequency of effort for particular fishing grounds and target species. These values were also detailed per community according to type of boat to distinguish the differences in livelihood dependency between Cayucos and motorised vessels. The analysis provides a guide only of fishing effort and value based on an average six month fishing season. It has not been possible to repeat this analysis for 2009 because no fishery CPUE or landings data was collected.

2.7.4. Qualitative analysis

The qualitative analysis in this thesis has evolved over the course of the research, and incorporates three approaches: thematic analysis, discourse analysis and grounded analysis. I am aware that my epistemological development has influenced the analytic development of the data, and this research does not fully adhere to any of the above mentioned approaches. I use a mixture of pre-determined thematic analysis based on my original research questions and grounded analysis which does not use preconceived ideas to construct theory. In this way, emergent themes are able to form the theory which explains the influences of the local context. This grounded inference has influenced the subsequent stages of design and review through the identification of important themes and data gaps that would improve the holistic understanding of the CCMPA context. In this way, the qualitative analysis follows an inductive approach, analysing the data in series with subsequent redesign and new techniques based on the thematic analysis that is developing. Theory is derived from the data which is systematically gathered and analysed throughout the research process.

2.7.5. Socio-economic analysis

Community and fisher livelihoods are analysed using the sustainable livelihoods framework which emerged in the 1990s as a response to failures of development interventions to account for complex economic, social and ecological components for rural agricultural economies (Scoones, 1998, Carney, 1998). This approach has been adopted by development agencies as a framework to evaluate the socio-economic outcomes associated with natural resource management and governance interventions, i.e., adaptive co-management (Plummer and Armitage, 2007). Therefore, a sustainable livelihoods approach provides a useful analytical structure to evaluate the economic outcomes that are resultant from adaptive co-management because livelihoods are also impacted by external economic, institutional and ecological factors, and subject to change from internal drivers including individual preferences, relationships and education. This thesis accepts the definition of a livelihood to be a set of strategies employed by individuals or households to make a living, including contributions from spatially distributed members of the household, determined by their access to resources and assets (Ellis, 2000; Plummer and Armitage, 2007a) but also accepting Farrington *et al*'s (1999) assumptions that individuals will

pursue a range of livelihood outcomes (income generation, health) to respond to changes in conditions and an individual's perceptions of those conditions.

During the pilot season in 2006, it was found that income data was difficult to collect in these communities because very few households keep any records of income for specific livelihood options. Therefore, no comparison of household income can be made within or between communities for this year. However, households have been classified by livelihood structure to enable a temporal analysis of livelihood change in each study site. Descriptive livelihoods analysis has been conducted using methods adapted from Bene *et al* (2009) to understand household livelihood structures and expenditures in relation to traditional fishing and non-traditional livelihood options. Households have been classified into four categories: fisher-specialist; fisher-generalist; generalist-fisher; and generalist. A fisher specialist relies solely upon fishing for income, a fisher-generalist obtains 50% or more of income from fishing but also engages in other income generating activities, a generalist-fisher obtains more than 50% of income from non-fishing activities (traditional and non-traditional) but also engages in fishing for supplementary income, and a generalist generates all income from non-fishing activities. Using these categories, the community livelihood structures demonstrate a similar contrast between the cayan and coastal communities as mean household income between 2006 and 2009.

In 2007 and 2009, details of household expenditures were collected as a proxy of total household income based on the assumption that Garifuna households do not use any formal banking system for savings. Instead earnings are invested in equipment, housing infrastructure and child education. A proxy for income was then generated for each livelihood option based on the relative importance for income given by respondents as a percentage value. The value of fishing for generalist-fishers, fisher-generalists and fisher-specialists in each community was generated using percentage expenditure measures to indicate the relative importance of fishing to the overall household income. Individual targeted interviews with specialist fishers in each community enabled more specific income data to be generated to measure the economic importance of fishing to the most dependent households. Catch data (species, weight) was provided by both respondents and the HCRF, and landings value was compiled based on species market values in each specific year. As identified by Daw (2008), fishing income generated using perceptions data collected from fishers would be dominated by more favourable memories

for the individual, especially for historical fishing episodes. In this respect, the negative relationship between most fishers and the HCRF, evident most significantly in 2006, has generated commonly held perceptions that the management regulations imposed by the HCRF have significantly inhibited fishing activity and subsequent fishing-derived income since 2004 when the first management plan was implemented. As expected, memories of fishing before the introduction of the management plan indicate higher catch rates than current conditions, but target species were worth less than the current market value. This may indicate one of two situations for artisanal fishing in the CCMPA: one, the market structure and export demand for fresh fish since 1998 has generated higher value for fresh produce instead of salted fish therefore reducing fishing effort; two, as Matlin (2004, in Daw, 2008) has shown, increasing costs of fishing, increasing market values for fish products but a decreasing catch rate might indicate reduced stock availability. This will be discussed in more detail in Chapter 4 which examines the biological sustainability of the CCMPA.

To account for Daw's (2008) observations, individual fishers were asked to recall details of average fish catches during each particular fishing season (2006, 2007, 2009) to provide information indicative of fishing costs and market values of species over the three years of data collection for this thesis. Although it has not been possible to generate accurate socio-economic dependency of fishers on the CCMPA, this information does provide indications of the impacts of the management restrictions in relation to individual decision-making, changes in fishing behaviour and practices, and selection of fishing grounds. It has also enabled a community fishing profile to be developed indicating changes in income over time, and the value of marine resources from fishing inside and outside the CCMPA.

2.7.6. Thematic analysis

The thematic analysis provides the framework for all other analyses and explanations because it is guided by the research questions and the literature base of the study. Themes were chosen for the contribution they made to a conceptual understanding of this case study. I have initially coded the qualitative interview, focus group and household survey data to generate themes that reflect my research perspectives. I have reviewed the frequency of particular codes that are most revealing or illuminating for specific research questions, and which make analytical sense. I have then combined these initial codes to create new ones and have re-evaluated the data under the

new codes/themes, producing analysis of axial codes. This allows for a constant comparison of connections between data, concepts and theories to produce an inductive analysis. This type of analysis is used to demonstrate how categories and themes are related to concepts, and then allows for theoretical elaboration of a concept. Using this inductive approach, theoretical saturation is only possible when all the possible categories in the data have been found, so further data does not contribute more understanding of the situation. However, a true inductive analysis is not possible in this case because ACM is an iterative process; the situation on-the-ground is always changing, altering perceptions of resources and management. Therefore, iterative thematic analysis in this case study provides illumination of factors affecting management as they develop in importance rather than allowing a comprehensive analysis of all factors. Questions I kept in mind during this analysis were how do you evaluate an emerging theme? Does it make sense? Does it answer the research questions? Is the analysis sufficiently interpretative? Does it develop from a phenomenological core? Is the structure clear and meaningful?

The process of thematic analysis was two-fold: by hand, and subsequently using the computer progamme NVivo. Preliminary analysis of themes was repeated as the data collection evolved to generate new emergent themes following a grounded theory approach. Transcripts were analysed for both thematic similarity and differences between respondents and across data types. I then created analytical categories from definitions and themes provided by fishers, communities and key informants and compared these with my assumptions about their situation. For example, do fishers identify themselves more as fishers or as Garifuna? Do they protect this identify in the face of fishing pressures or identify as something else? The definitions used to develop each theme were written down as both *in vivo* (the natural language used by participants) and as socially constructed (my own terminology or understanding). Importance of themes was determined by both frequency of occurrence (quantitative) and recognition of one person's perception as important where it has a significant impact on my understanding of the situation. In this sense, the themes have been analysed for intended and received meaning. Which is most important to me and my epistemological position? How has this changed as I have changed?

After further interviews were conducted, categories were refined to account for these new and different perspectives of the same interview questions and also different situations. Therefore, all

transcripts were re-analysed with a focus on the following concepts and categories: conservation (knowledge building, transfer of knowledge, perception of health of environment, attitudes to environment), socio-economics (occupational multiplicity, perception of reliance on resources, economic dependence on resources, higher earning pre-regulation) and governance (traditional management, inheritance of traditions hindering ability to respond to changing environment, inheritance of traditions important for survival of communities, HCRF management, social capital, attitudes to management). These concepts have also provided the basis for inferential evidence presented in this thesis reflecting the development of my understanding of the effectiveness of the two management models.

2.7.7. Discourse analysis

Discourse analysis has been a key analytical tool in this thesis as an approach to the concepts of natural resource management derived through language. Discourse was a term used to denote the way particular categories relating to an object, and the ways of depicting that object, frame the way it is comprehended, thus the discourse used to describe an object becomes a conceptual version of that object (Foucault, 1926 in Bryman, 2008). This generates an intrinsic understanding of an object that has come to be thought of as fact, and it becomes the way that object is conceived by specific groups. This then becomes a framework for the distribution of power, and a justification of that distribution, when a certain conception of an object becomes the dominant way of thinking. Taken in these terms, discourse then becomes more than language; it is the construction of the social system. This analysis is an important tool to understand the dominant discourse and associated power in the governance structure of the CCMPA. Hegemonic scientifically-derived discourse has traditionally been dominant in fisheries management, yet analysis of the conceptual understanding of the social-ecological system at the local-level revealed a different socially-derived discourse among communities.

I have used a constructionist approach to evaluate the emphasis placed on the different concepts of management held by the different social groups and institutions during the two management cycles. This approach recognises that discourse is constructed from many different versions of reality, forming a concept that shows characteristics specific to each social group. These characteristics then allow for ‘policy storylines’ to be created, following the example of Fischer (2003) that generate narratives that permit stakeholders to draw on various categories to give

meaning to a specific object or social phenomenon. These narratives can then be characterised between the extremes of 'there is nothing we can do' or 'we must do something now' to explain the perceptions of the outcomes of management within different stakeholder groups. Thus, discourse analysis can identify the dominant concepts emergent from the CM and ACM models within the governance system, and identify key differences between social-ecological understandings at different scales.

2.8. Validity and reliability

As Hall-Arber *et al* (2009) have pointed out, there are inherent problems associated with using perceptions data to assess and monitor the performance of management and governance which is rooted in conventional scientific indicators that provide statistical robustness. Perceptions of respondents may be distorted by self-interest, different levels of understanding and education on a subject, and by the methodology used to extract information. It is difficult to appraise the reliability of perceptions because all perceptions data will be subjected to various and unknown sources of error and bias, and an inherent time lag before measurable reactions have occurred. However, my research has been able to measure the perceptions of stakeholders over a transition period from the first management plan to the second, enabling me to observe the reactions of stakeholders to the initial management regulations (2006, 2007), the process of management change (2007), and to the second management plan (2009).

The reliability of using perceptions data was demonstrated by the consensual understanding between community respondents and key informants from the HCRF and government departments over perceptions of marine resources, community governance and management successes and failures. Measures of perceptions have provided evidence of mutual knowledge, and have also highlighted significant areas of divergent understanding that needs to be addressed. These different perspectives provided interpretive triangulation over key issues for the management regime, and offered an epistemological starting position for any changes that may be necessary to the regime.

The inference quality of the data [a term coined by Tashakkori and Teddlie (2003c) to evaluate the quality of the conclusions that are made on the basis of both quantitative and qualitative findings] can be supported through comparisons with other successful studies that have used a

similar mixed methods approach. The household survey has been designed to be compatible with studies by Cinner *et al* (2005) and McClanahan *et al* (2008) in the Seychelles and Mauritius. Both studies have used a mixed methods design which has allowed resource dependency analysis to be conducted. Similarly, Bene *et al* (2009) collected data from fishers in the Congo, and applied a similar livelihoods analysis to assess the contribution of fishing to the local economy. In my research, I have combined the approaches used in these studies to explain the level of dependency on marine resources across communities, and its implications for interest in participation with management. Measures of social capital and impacts of migration on the communities followed the techniques applied by Crona and Bodin (2006) in Kenya which was used to analyse the market forces governing coastal fishing communities.

Reliability has also been maximised by using a mixed methods design, allowing for different data types to be triangulated, documenting multiple perspectives over the same foci of discussion. This approach has enabled me to analyse the similarity of the data from different respondents using the same technique (i.e., household surveys) and between stakeholder groups (i.e., key informant interviews), and also across respondents using different techniques (i.e., fishers focus groups, individual fisher's interviews and key informant interviews). Therefore, it has been possible to develop a sense of truth and reality based on the levels of similarity or difference between responses. Through the development of my own understanding of the localised context of the CCMPA, I have developed a personal sense of the validity of the information and the reliability of the source of that information. The factors that I considered for this purpose were individual agendas, positions within communities or organisations and levels of involvement with the marine environment and the HCRF (affecting knowledge of the subject). I am aware of bias in the data, most prevalent in the household economic questions included in the household survey. To increase the reliability of the economic data, expenditure based on specific household needs and goods was asked for as a proxy for income. This provided an appropriate alternative to income data because there is no banking system in these communities, therefore income is approximately the same as expenditure. However, there is also a clandestine black economy in the communities involving drugs and monetary remittances received from family members working illegally abroad which may have affected how far the respondent was prepared to disclose financial details.

During the acquisition of data, I tried to maximise their validity and reliability by using the same translators where possible to avoid translation bias and irregularities, and I also trained all students who were involved in my research as explained in section 6 of this chapter. This was to reduce the variance in interview style and ability of the translators. As previously explained, it was also important to use a standard database and categorisation system to reduce variance between response coding by both myself and the students. During the analysis of the data, I have confidence in the reliability of both the data and my interpretation of the data, because I generated the same results upon repeat examination. The household survey data was used by multiple researchers because it had been categorised and statistical analyses by me and the students yielded the same results. I am also confident about the thematic conclusions that I have drawn from the data based on the analyses documented above. More generally, I am confident in the validity of the findings though I do not seek to make generalised claims beyond this case study. I am happy to restrict myself to assist understanding the evolution of and process of participatory governance in the context specific setting of the CCMPA.

2.8. Ethical considerations

This research has adhered to the ethical policy of the Economic and Social Research Council (ESRC), and was approved by the School of Geography, Politics and Sociology (GPS) at Newcastle University. The principles of ethical policy include integrity and quality of research, informed consent of participants, confidentiality of information, anonymity of respondents, voluntary participation of respondents and declared impartiality or partiality of the researcher (ESRC Research Ethics Framework (REF), 2005). This research has an added layer of risk because of the data sharing agreements with the CASE partner and the HCRF, which increased the communities' vulnerability because of the power relations between themselves and the managing agency. In the research, paramount importance was given to information confidentiality and respondent anonymity, and all results have been presented to the CASE partner and HCRF at the level of community response (not individuals), and any reference to key informant perceptions has been identified by community or organisation only with a corresponding identification number and code.

Working with Opwall, I have been required to annually provide a detailed ethical policy incorporating a declaration of participation to be used before every interview in the field. This

declaration was provided in both written and oral forms to every participant to ensure that the data provided would be treated in accordance with the above mentioned policies. It was also stated that participants could refuse to answer any question with which they felt uncomfortable. Oral consent was collected at the beginning of every interview, and participants could withdraw from the interview at any point. At no point in the investigation were participants offered money for taking part in the research (which is a strict code of practice for Opwall).

I was aware throughout the research period that working with Opwall would be perceived by the communities as demonstrating an allegiance with the HCRF. However, I did not feel as though any respondents were coerced to participate from leaders of the community or fishing groups, nor did they present specific information to uphold an image of the HCRF. However, despite ensuring anonymity of respondents and using false names, I believe it is possible to identify individuals based on their positions of power within the community. Leaders in the community are more easily identifiable by the HCRF than randomly selected households and fishers. I was cautious therefore over including positions of key informants in reporting of the data. However, leaders were willing to be included in the research seeing it as a mechanism through which they could voice their opinions (negative and positive) to the HCRF without fear of repercussions, and have therefore been given a separate code (CL) in the presentation of the data.

This research has followed the guidelines for ethical considerations as stated by the ESRC and School of Geography, Politics and Sociology at Newcastle University, however there have been additional ethical considerations encountered in the field. At various stages throughout each research period, the translators became overly involved with the dilemmas of the communities (especially regarding fishing regulations) which I felt at times compromised their impartiality. This was most apparent in 2007 when the translators became animatedly involved in focus group discussions, and helped fishers to write the 'carta de negociacion' which was subsequently presented to the HCRF[11] (discussed further in Chapters 3 and 4). In 2009, one of the American translators also had an ethical issue with asking respondents about their economic well-being, which placed her in tension with the aims of the research. I also felt responsible for the way the

[11] This was a letter written by fishers from Nueva Armenia, Rio Esteban, Chachahuate and East End in response to the filming of the Reality Show in the CCMPA, demanding to receive financial compensation for lost fishing revenue.

students were perceived in the community, and had an obligation to ensure that they were both respectful of the local customs, and respected by the community members.

2.9. Methodological issues and problems

During the course of this research, I encountered several methodological issues that have inevitably impacted on the data collection and analysis. First, the Garifuna communities have suffered from interview fatigue because they have become a heavily studied ethnic group since receiving UNESCO status in 2005. Research fatigue has also been exacerbated by the continual presence of the Opwall social science group, and I received many complaints from respondents that they were being asked for the same information every year. The communities have also, to date, not seen any direct development as a result of their participation in the studies which is building up resistance to future participation. Second, it has been necessary to use different translators every year, which has diminished the comparability of the data collected and subjected the research to different biases as a result of their differing levels of involvement with the communities. Third, different techniques yielded qualitative and quantitative results that can be applied to a narrative understanding of the CCMPA as opposed to direct quantitative comparison which was the preferred analysis of the CASE partner. Fourth, the data collection has been inhibited by natural climatic events including three hurricanes and an earthquake, which prevented me from completing the proposed data collection in Chachahuate and East End in 2006, Chachahuate and Utila in 2007 and Utila and Rio Esteban in 2009. Fifth, data collection was inhibited in 2009 by national political unrest following a military coup in June 2009, which caused disruption as a curfew was imposed across the country and roads were blockaded as demonstrations were staged. Sixth, the continuity of the data collection was interrupted because I did not conduct research in 2008 because of my own ill health. However, this data collection gap allowed me more time to conduct an advanced analysis of the data collected in 2006 and 2007. It also generated a sufficient period of time for the new management plan to be implemented and so be able to examine the process and outcomes of the ACM regime in 2009.

2.10. Reflections on the research process

Throughout the course of this research, I have not only gained skills as a researcher, but also skills as a supervisor and appreciation for alternative ways of approaching a problem to find a

solution. I have also learned how to manage relationships, particularly with the diverse range of people who have been involved in this research. This has meant cultivating different resources to develop and manage relationships with supervisors, respondents, peers, students and translators, who all had an important and substantial influence on my abilities as a researcher. Throughout the course of this research I have learned how to manage multiple projects, how to delegate responsibilities and the best ways to offer support to staff/students (academically, emotionally, socially). I have also encountered gender bias for the first time, and have learned how best to manage in a situation where I was sometimes viewed negatively by male respondents because I was female, young and unmarried.

All of the above data collection techniques and analytical methods are problem-focused, looking at where the problem lies and how it has developed from different perspectives. I understand that at times there is a need to look for solutions to problems which requires a more action-based research for organisational development, however, such research design was beyond the realm of this thesis, because it was first necessary to identify the different perspectives of the governance system in order to find misunderstandings and differences. The next stage of the process will be to conduct a solution-based enquiry of the HCRF as an organisation, assessing the process of different management models and associated problems.

CHAPTER 3: ECOLOGICAL KNOWLEDGE AND EFFECTIVE CONSERVATION UNDER CO-MANAGEMENT AND ADAPTIVE CO-MANAGEMENT ARRANGEMENTS IN THE CCMPA

3.1 Introduction

Effective conservation in any protected area requires the compliance of resource users (Hanna and Munasinghe, 1995) as a way to reduce the enforcement costs involved with management. Jentoft (1993) found that these costs are directly related to how various stakeholders perceive management's effectiveness and fairness. Therefore, not only must the managing agency achieve effective conservation, it must also deliver it in a legitimate and transparent manner to improve the perceptions of management. Conservation benefits must also be equitably distributed between user groups to dissipate heterogeneity of compliance, and co-management arrangements must contend with the potential that short-term interests of local user groups may supersede the long-term conservation aims if there is no shared understanding of the resource problems between different stakeholders. One approach to improve compliance with conservation regulations is to redirect labour and capital away from activities that can degrade ecosystems (i.e., small-scale fishing) and encourage other commercial activities that enhance ecosystem health through different use of resources (i.e., ecotourism) (Ferraro, 2001). Yet, as Palacio *et al* (2006) argue, if everyday interactions with the marine environment (like those generated by hours spent fishing) are removed, local user groups may become disconnected from their local environment leading to non-compliance and neglect.

This chapter will examine the conservation effectiveness of the two management plans (2004-2008; 2008-2013) as perceived by the local communities; the impact conservation regulations had on community natural resource use over the two management cycles; and drivers of non-compliance with fishing regulations. To set the scene, the history of conservation in the CCMPA will be reviewed providing a detailed account of historical fishing dependency by the Garifuna on natural resources of the CCMPA. I will then outline the conservation agenda in the first management plan and subsequent changes in fishing dependency in each community. Drivers of non-compliance are examined as well as external events that have impacted upon conservation in the CCMPA. The second management plan will then examined and changes in fishing

dependency analysed based on fishers' perceptions. Finally, the potential of achieving effective conservation and compliance through ecotourism will be examined before final conclusions are drawn.

3.2 Conservation history and drivers for designation of CCMPA

The CCMPA forms the southernmost extension of the Mesoamerican Barrier Reef System (MBRS) (Figure 3.1). The MBRS is the second largest barrier reef in the world, stretching for over 1000 km from the Yucatan Peninsula in Mexico to the Bay Islands in Honduras (Arrivillaga and Garcia, 2004). The CCMPA is an archipelago which consists of two main islands and thirteen cays made of sand and coral. There are several habitats including coral reefs, sea grasses, corals, sand, algae and mangroves. Associated with these habitats are commercially important species of fish and crustaceans (including the spiny Caribbean lobster, *Panulirus argus*), reef fish species, endangered queen conch (*Strombus gigas*) and some turtle species. In addition to the marine habitats, the CCMPA terrestrial habitats also include several bird species that are important for the ecology of the reef, and two endangered reptile species – the pink Boa constrictor (*Constrictor imperator*) and the black-chested ctenosaur (*Ctenosaura melanosterna*) (Reed et al, 2007).

To ensure the protection of the Cayos Cochinos area, in 1993 a group of Honduran businessmen in association with AVINA created the Society for Ecological Investments (SIEC). SIEC had two main purposes: 1. to fund the acquisition of several of the Cayos Cochinos land areas (Cayo Menor, Cayo Paloma, Cayo Galla, Cayo Bolanos and one hectare of Cayo Mayor), and 2. to instigate and fund the Honduran Coral Reef Foundation (HCRF) to 'manage a scientific station and to develop conservation and management measures for the protected area' (Andraka et al, 2004:31). The members of SIEC also had congressional influence, and lobbied the Honduran government to give the Cayos Cochinos protected status in the same year.

The HCRF was created in June 1994, initially funded by SIEC with the task of generating supplementary funding for conservation projects. To prioritise conservation, the HCRF signed an agreement with the Smithsonian Tropical Research Institute (STRI) to create a scientific research station (Andraka et al, 2004) and to conduct a scientific survey to assess the biological diversity

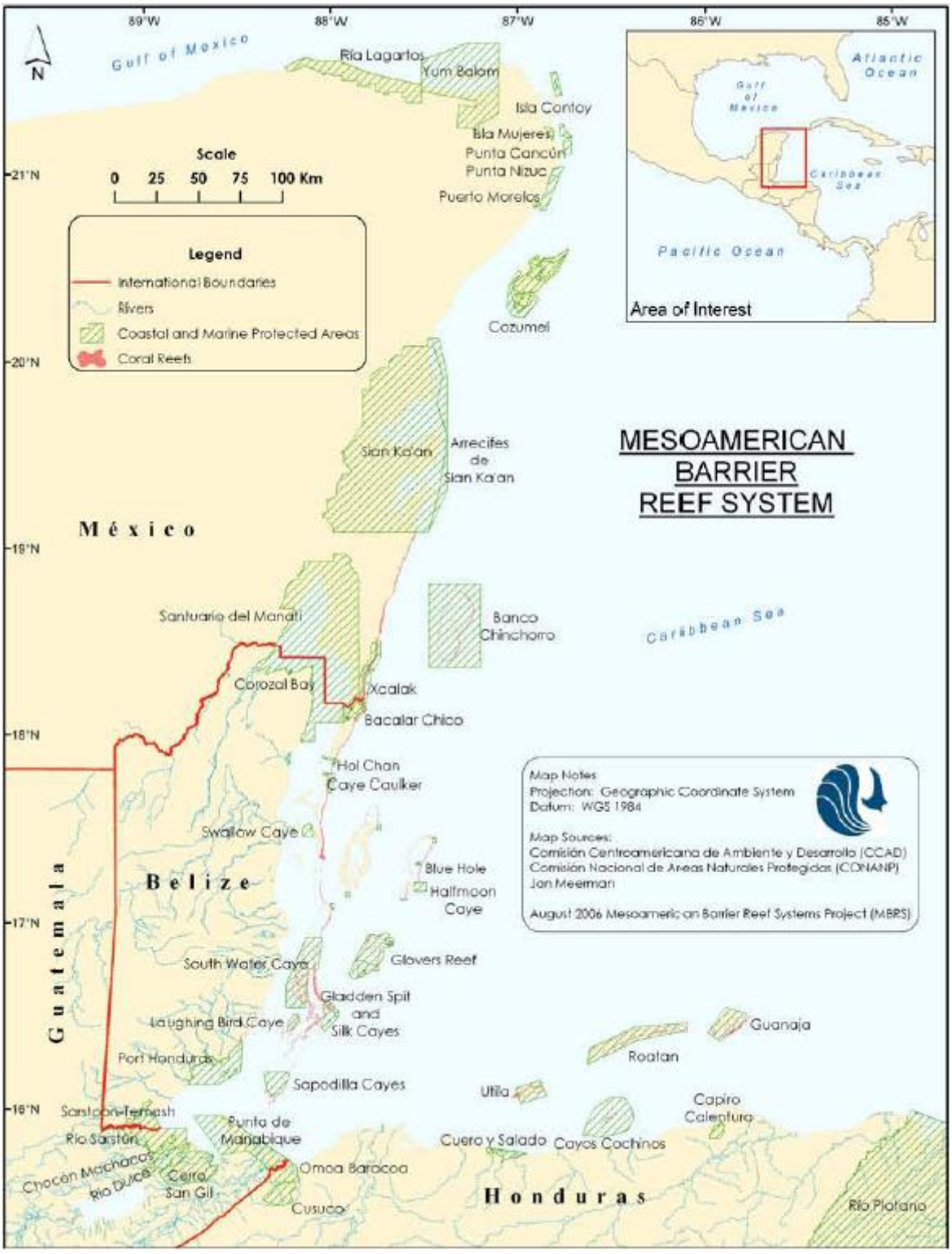

Figure 3.1: Southernmost extension of the Mesoamerican Barrier Reef System (MBRS) (Source: Comission of National Natural Protected Areas, TNC-MAR Program).

of the area, as well as suggesting management measures to preserve the health of the ecosystem (Jimenez-Castro, 2008).

The STRI built a research station on the island in partnership with the AVINA Foundation of Switzerland, the private owners of the protected area and the Honduran government, and also took the leading role in managing the CCMPA from 1994-1997 (Jimenez-Castro, 2008). The STRI found that the reef system here was the least disturbed area in the Bay Islands region, making it the best location for protection as part of the MBRS protected areas network, and the area served as a research base to understand genetic variation in the Wider Caribbean (Schultz, 1995). Yet industrial fishing pressure had removed the top predators from the ecosystem, making the area vulnerable to overfishing (Guzman, 1998). As a result, the management measures suggested by the STRI included comprehensive conservation monitoring and protection; a total ban on fishing and extractive activities of all marine species; further controls of all human activities in the area; full-time patrol guards; and controlled tourism developments.

However, such drastic fishing control measures badly affected the livelihoods and cultural traditions of the local fishers, and created severe, lasting and damaging conflicts with the STRI that still have an impact on management almost twenty years later. Yet, the STRI planned to create unique sustainable development projects supporting 'mariculture or sea-farming ventures operated for and by the Garifuna' (Schultz, 1995:1), and promised to continually assess the small-scale fishery to potentially change or remove fishing regulations in the future. However, by 1998 the HCRF had resumed full overall management of the area and proceeded to develop a management agenda for the CCMPA in conjunction with WWF and AVINA (Andraka et al, 2004). The HCRF and WWF together developed a strategic direction for the CCMPA, aimed at protecting the marine biodiversity of the area using the original regulatory measures of the STRI. Although the first management plan followed these preservationist regulations, it did not fulfil the promise of fishery assessment or sea-farming ventures.

The STRI-led preservationist agenda prioritised the importance of scientific understanding and advancement over the sustainability of local livelihoods and alternative developments. Local Garifuna fishers felt aggrieved over the prohibitive regulations because the STRI had agreed that the CCMPA ecosystem was relatively untouched, in part as a result of sustainable fishing

practices maintained by the local fishers. However, the destructive practices of industrial trawlers changed the methods employed by the Garifuna to maintain economic viability, which increased their ecological impact on the CCMPA ecosystem.

3.2.1. Industrial fishing

In the 1980s, the Caribbean Large Marine Ecosystem (CLME) produced an estimated catch of around 0.5 million metric tonnes per year (FAO, 1987), and Honduras' fisheries accounted for 0.05% of this catch (250 tonnes per year). However, the majority of small-scale fishing was often unregulated and unaccounted for, meaning that this figure was most likely to have been significantly higher. The most widely harvested species in the region was the spiny Caribbean lobster which was subjected to intensive fishing pressure. As a result, the long-term sustainability of the species was jeopardised as landings were often below the minimum standards for reproductive maturity (Richards and Bohnsack, 1990). Intensity of fishing pressure in this decade (discussed in Chapter 1 section 1.3.2) concentrated most fishing activity (industrial and small-scale) for crustaceans along the continental shelf and in shallow coastal waters of the north coast (MacKensie and Stehlik, 1996). The impacts of overfishing lobster shifted small-scale fishing effort to coral reef fish species, which have since become a major fishery in the southern Caribbean.

Since the mid-1980s, industrial trawlers began fishing the inshore waters of the north coast, using trammel nets to target shrimp. However, for every ten tonnes of shrimp caught, the nets would also take two tonnes of fish indiscriminately, which was then discarded (DIGEPECSA, KI interview 23/06/07). The main target species for small-scale fishers at that time was also shrimp, lobster and conch. Once the industrial trawlers began to fish in the same areas, the Garifuna changed their fishing techniques and targeted finfish species to continue to make a living. Fishers started to use nets across river estuaries to compete with the industrial trawling, and introduced fish pots which substantially increased the catch rate against hook and line (Nueva Armenia, oral history, 18/07/07). These problems were identified by DIGEPESCA as localised development of unsustainable fishing practices, but they did not have sufficient funds to monitor or regulate these activities (DIGEPESCA KI interview, 03/06/06).

3.2.2. History of small-scale fishing

Despite the introduction of some destructive gear(s), small-scale fishing using hook and line methods on patch reefs was of great significance to the Garifuna. Traditionally, the first person to find a new fishing ground would give his name to it, and pass the information on to allow communities to share in a new, fertile ground (CHA fisher interview 26/07/09). Without the availability of modern GPS systems, Garifuna fishers would use traditional navigation using the moon, stars and mountain peaks for guidance, making fishing trips for yellowtail snapper (a species caught at night), and being entirely dependent on good weather conditions. While industrial vessels would be able to fish on any night, small-scale fishers were restricted by weather patterns and poor technological innovation. Without government or NGO assistance to improve small-scale technical capacity, fishers were forced to learn from their own experiences and respond to new pressures alone. Therefore, without external assistance, small-scale fishing became ecologically unsustainable in an effort to remain economically sustainable.

Additionally, in the late 1980s, marketisation of fish products changed in favour of fresh fish. Traditionally, small amounts of red and white finfish were caught, dried and then salted to be sold by the Garifuna women in local communities and towns. When the market demanded freshly caught fish to be frozen for export, the value of finfish increased and with it so did the incentive for greater CPUE of finfish. The market expanded beyond the local area and introduced a new role for middlemen to buy all catch at community landing sites and sell on for profit to factories and exporters. Middlemen increased the efficiency of getting fresh fish to market, and guaranteed a set price for the fishers (Nueva Armenia, oral history, 18/07/07).

The rapid change in small-scale CPUE, to compensate for industrial fishing and a new market trend for fresh fish, was not accompanied by community-level extraction regulations. Garifuna communities had unwritten rights over territorial waters (discussed below in section 3.2.3) that were respected by fishers from other communities, but no formal community sanctions existed to regulate fishing activities to promote sustainable practices. The Garifuna communities received no assistance to promote sustainability that could have helped to create and support effective conservation. Instead, local fishers had to rely on traditional knowledge and their own experimentation to derive benefits driven by rational economic choice. Although small-scale

fishers had started to use fishing more as a main source of income by the 1980s, collectively they were not given the opportunity for technical improvements that would have promoted income and sustainability, but were instead subjected to a moratorium on all fishing and subsequent conservation policies that were targeted at a conservation agenda disproportionately above the scale of their impact.

Small-scale fishing in Garifuna communities was conducted without strong traditional rules controlling extractive activities. Despite this lack of local regulation and infractions for non-sustainable practices, 100% of the fishers interviewed in 2009 to ascertain historical fishing trends believed that before the CCMPA was designated as a protected area, they had maintained the health of the ecosystem. Fishers in all three communities stated that they were not extracting species beyond reproductive capacity, controlled by their biological knowledge and social norms of acceptable behaviour. Therefore, while no formal rules existed to regulate fishing effort, local-level knowledge for sustainability of target species did produce community-wide social pressure of acceptable fishing limits. However without any formalised community-controls for conservation of marine resources, local-scale exploitation was dictated by individual and socio-economic needs because there were no specific social or economic repercussions of over-exploitation. While lack of community regulation was not overly problematic when small-scale fishing was less productive, following the onset of industrial fishing and increased small-scale effort, lack of controls allowed individual economic incentives to prevail over sustainable practices.

3.2.3. History of small-scale fishing effort

Before the designation of the CCMPA as a natural sanctuary in 1993 and subsequent fishing restrictions, the Garifuna frequently used the fishing grounds in the area to generate household income. Lobster fishing was the most commercial species (approx. 4 lempiras/lb; US $0.22/lb), but finfish had become a more valuable catch because of the market for freshly caught fish (approx. 20 lempiras/lb; US $1.1/lb). Eight finfish species from only three genus (Lutjanidae - snappers, Serranidae - groupers and Haemulidae - grunts) made up 80% of the collective catch from inside the CCMPA by all three communities. Fishers were primarily active during May to November when the weather conditions were more favourable, indicating that effort was

restricted to this six month period. During the rest of the year, fishers would pursue other livelihood options for income, but continue to fish for subsistence in more sheltered fishing grounds. Recollection of average catches in 2009 by fishers in each community that had been active in the area since pre-1993 revealed that although the target species were the same as the modern fishery, the quantity of each species landed was lower. Technical capacity limitations and higher market values of species were given as the reasons for this lower historical catch rate by respondents in all three case study communities.

3.2.3.1. Rio Esteban

Of the fishers interviewed in Rio Esteban (n=4) in 2009, all of the respondents stated that they targeted the same species as before the introduction of the CCMPA, but lobster and conch were now the main component of the catch (62%). Both lobster and conch had a much lower value before the moratorium on shellfish was introduced, reflecting the market value when there was high availability of shellfish. On an average day, fishers recalled that they landed up to 30 lbs of spiny lobster and 20 lbs of conch per fishing trip. Fishing was concentrated in the same grounds inside the CCMPA that were still used in 2007, and 62% of the total catch was from areas inside what became the CCMPA. These fishing grounds represented the territoriality of Rio Esteban in the south-east and north-east of the CCMPA boundary. However, fishers in this community targeted different species of grouper 'because it was available' and had a higher market value than other red fish species (35 lempiras/lb; US $2) (Rio Esteban Fisher interview 17/07/09). Based on fishers' recollections, the average amount of finfish species caught per fishing trip was 20 lbs. Lobster fishing was the main target species because highly productive fishing grounds were located in the south-eastern areas of the community's CCMPA territory. These areas were more accessible for fishing with canoes, within 6 nautical miles of the community. Based on these perceptions of historical fishing effort, over a six month fishing season (3 trips per week), each individual fisher would have caught up to 1450.8 lbs of lobster, 967.2 lbs of conch and 967.2 lbs of finfish, from fishing grounds inside what became the CCMPA (Table 3.1).

3.2.3.2. Nueva Armenia

The fishers interviewed in Nueva Armenia (n=8) in 2009 claimed that lobster and conch had been the main components (67%) of their catch before 1993. On a typical day, the fishers

interviewed recalled that on average 40 lbs of lobster were caught and 30 lbs of conch. Finfish species accounted for 33% of a typical catch, totalling on average 35 lbs per fishing trip. Yellowtail snapper (*Ocyurus chrysurus*) was the most frequently caught species (76% of catch). Around 60% of total catch by fishers in this community was from inside the CCMPA, almost double the proportion in 2007, and fishers claimed that they have always used the same territorial fishing grounds. However, fishing grounds in the south-west and north-east were most frequently used before the designation of the CCMPA because CPUE was restricted by technical capacity. Grounds to the south-west were favoured by lobster fishers, whereas the fishing areas in the north-east were productive for finfish species. The average distance reported for a typical fishing trip was 8 nautical miles, the physical limit of fishing using canoes with sails. Lobster fishers would work in groups, while fin fishers worked individually, but often fished alongside friends for companionship and safety. Based on the historical landings perceived by the fishers interviewed, during a six month fishing season each fisher would have caught up to 1872 lbs of lobster, 1404 lbs of conch and 1638 lbs of finfish from fishing grounds inside what became the CCMPA (Table 3.1).

3.2.3.3. Chachahuate

Chachahuate, located inside the CCMPA, was the least dependent community on resources from inside the protected area, historically landing an average of only 47% of the total catch (n=8). Fishing grounds inside the CCMPA within the territory of this community were often used during periods of poor weather as they offered more sheltered locations in close proximity to the community. When the weather conditions were good, fishers concentrated more of their effort in areas to the north of the CCMPA boundary, which were highly productive for yellowtail snappers, groupers and grunts which made up the majority of the finfish catch (88%). Fishers reported that on an average fishing trip, 25 lbs of finfish would be landed. However, like the two coastal communities, before the introduction of the CCMPA the majority of the catch was lobster and conch (64%) from fishing grounds in the south-east of the CCMPA, bordering the Rio Esteban territory. On an average fishing trip, fishers recalled that they would catch 45 lbs of lobster and 35 lbs of conch. By exploiting fishing grounds close to the community (average 2 nautical miles), fishers in Chachahuate had the greatest CPUE than either of the other

communities. However, the increased effort and proportionately greater amount of catch was outweighed by the additional journey to market for sales outside the community. Based on the historical fishing trends recalled by the fishers interviewed in 2009, over a six month fishing season each individual would catch up to 1649.7 lbs of lobster, 1283.1 lbs of conch and 916.5 lbs of finfish from fishing grounds inside the CCMPA (Table 3.1).

Table 3.1: Average catch (lbs and kgs) of lobster, conch and finfish per fisher per community in 1993, based on recollection data from fisher interviews in 2009. Catch is shown as a total estimate over a six month fishing period (3 trips per week, 26 weeks), and the proportion of catch from inside the CCMPA boundary.

Community	Lobster (lbs)	Lobster (kgs)	Conch (lbs)	Conch (kgs)	Finfish (lbs)	Finfish (kgs)
Rio Esteban total	2340	1053	1560	702	1560	702
Rio Esteban inside CCMPA (62%)	1450.8	652.86	967.2	435.24	967.2	435.24
Nueva Armenia total	3120	1404	2340	1053	2730	1228.5
Nueva Armenia inside CCMPA (60%)	1872	842.4	1404	631.8	1638	737.1
Chachahuate total	2510	1129.5	2730	1228.5	1950	877.5
Chachahuate inside CCMPA (47%)	1649.7	742.365	1283.1	577.395	916.5	412.425

These findings are consistent with Palacio *et al* (2006) study of a Garifuna community in Belize that was also dependent on small-scale fishing for income. He found that in a typical day a fisher would land between 200-300 lbs of both shellfish and finfish, and classified the fishers into three groups depending on their equipment and target species. Palacio *et al* found that those individuals using hook and line caught the smallest amount, restricting their fishing activities to areas up to only 2 km from the beach, and sold their catch in localised community markets. These fishers would only fish for income when other options were not available, thus they did not require a greater level of technical efficiency. A second group was classified that used gill nets at distances up to 8km away from the shore, and by using the nets, these individuals caught

higher quantities of fish which was then sold to middlemen for trade in local towns. A third group (of divers) was classified that specifically targeted lobster and conch to be sold for export.

Palacio *et al* (2006) identified a socio-economic connection with fishing based solely on the need for income. Therefore, when the weather created poor conditions for fishing, the individuals in Belize chose to pursue different activities. Thus fishing was controlled by supply and demand and by livelihood plurality. Yet a cultural connection with fishing remained through diet, as many species of fish and shellfish played an important role in traditional celebrations. However Palacio also found that diet was influenced by the market value of fish, and when chicken became cheaper than fish, fishers chose not to pursue fishing for income because they would have been unable to sell it.

Similar classifications can be identified in the case study communities before the CCMPA was privatised because no restrictions existed on either gear or target species. Therefore, gear and species restrictions would have reduced an individual's ability to generate income from fishing when restricted to the hook and line method. However, hook and line was only suitable for sheltered, shallow fishing grounds, meaning that fishers using the CCMPA would have to either use this equipment in less suitable areas, or find new fishing grounds outside the CCMPA.

While fishing grounds inside the CCMPA were important for all three case study communities, all respondents except one stated that fishing was always conducted using hook and line (considered sustainable) even before the designation of the protected area to extract finfish. Yet one individual fisher from Chachahuate claimed that many fishers were using destructive practices including dynamite, fish pots and gill nets inside the CCMPA boundaries (Chachahuate Fisher interview, 28/07/09). This could be interpreted either that the other fishers interviewed wanted to be seen as conservation-oriented and environmentally aware by not admitting to destructive fishing practices (respondents feared that such information may be used against them), or as an example of the practices by a few rogue individuals who were fishing in the CCMPA. Whichever interpretation is nearer to the truth, the problem remained that small-scale fishing for shellfish combined with industrial fishing for shrimp was putting unregulated pressure on coastal ecosystems, and that the CPUE in the CCMPA was equivalent to overfished areas

elsewhere in the southern Caribbean that would indicate overexploitation was jeopardising the integrity of the fishery (Guzman, 1998).

3.2.4. Paradox of privatisation – conservation and non-compliance

The industrial fishing pressure combined with the increasing competitiveness of the Garifuna fishers was threatening the sustainability of the natural resources of the CCMPA. Under the open access regime, rational choice and economic exploitation were more important in the short-term than the future sustainability of the fisheries. Without intervention a 'tragedy of the commons' situation might have ensued for the CCMPA, damaging the health of the ecosystem and all livelihoods dependent on its resources.

Yet the threat from industrial fishing to the natural resources of the CCMPA was too large for the local communities to resist or prevent damage to their traditional fishing grounds alone. By privatising the CCMPA islands, and subsequent designation as a protected area which removed this threat, both the ecosystem and the local livelihoods dependent on marine resources were actively protected from further degradation. The act of privatisation changed the area from being an open access system to a closed system, with allocated user rights. These user rights were clearly defined and enforceable, designed to allow fishers to identify with the long-term need for conservation and to ensure the benefits of long-term sustainable fishing by offering a sense of propriety and ownership:

> '*we hope it will give a sense of property, they would have ownership over the resources, and take care of it for the longer term. Since no other groups are coming here and using it, they will have more property'* (HCRF KI interview 19/06/06).

Under this rights-based fishery, it was hoped that the CCMPA would provide security (of resource use) for life, permanence, exclusivity and transferability. Yet the privatisation of the area largely ignored traditional territories used by each community. Marine territories were not officially recognised as belonging to any community, despite the fact that they had been respected by fishers in different communities to provide specific fishing areas within close proximity to each community. However, under privatisation the whole area was opened to all those communities given rights of access, which removed the traditional territories. Furthermore,

the strict regulations enforcing closed zones within the CCMPA correlated with fishing grounds closely associated with all three communities in this case study, but only Nueva Armenia was allocated a specific area to continue lobster fishing, having been recognised by the HCRF as the community most impacted by the CCMPA. While at the meso-scale this allocation was expected to alleviate the socio-economic disadvantages for Nueva Armenian fishers, at the micro-scale it created new conflicts between communities. The official designation of a fishing area for the specific use of one community not only produced inequitable rights of access, but gave an advantage to fishers in Nueva Armenia who were also granted access rights to all the open fishing areas inside the CCMPA regardless of traditional territorial use.

Privatisation and allocation of user rights produced a new stratification of resource users which threatened to undermine the original conservation aims. Local user groups were not collectively empowered in the management process, but instead power was granted to select community representatives (discussed in Chapter 5 section 5.2.4). This stratification did not allow local users to develop communal institutional arrangements to manage the resources as a common property, and privatisation did not produce an equitable distribution of power and access to all allocated user groups. Thus, the CCMPA became a de facto open access regime because individual fishers began to operate outside of the regulations.

3.3. First management plan (2004-2008) – 'ecology without politics'

After a two year development phase, the first co-management plan was implemented for the CCMPA in 2004. Heavily influenced by the recommendations of the STRI, the plan focused on the representativeness of the CCMPA of the southern MBRS, and introduced preservationist objectives to conserve commercially important species and protect the reef structure (Figure 3.2). The plan designated three zones for different classifications of activities (Figure 3.3): zone 1 was a no-take-zone (NTZ) which prohibited all extractive activities in a nucleus area for up to 500 metres around the two main islands in the CCMPA; zone 2 incorporated closed areas for lobster recovery during the breeding season but permitted hook and line fishing using traditional boats only; and zone 3 was the outer area which was permanently open for hook and line fishing. Zones 1 and 2 corresponded to traditional community fishing grounds, whereas zone 3 corresponded to less productive areas. In addition to the zoning of fishing grounds, regulations

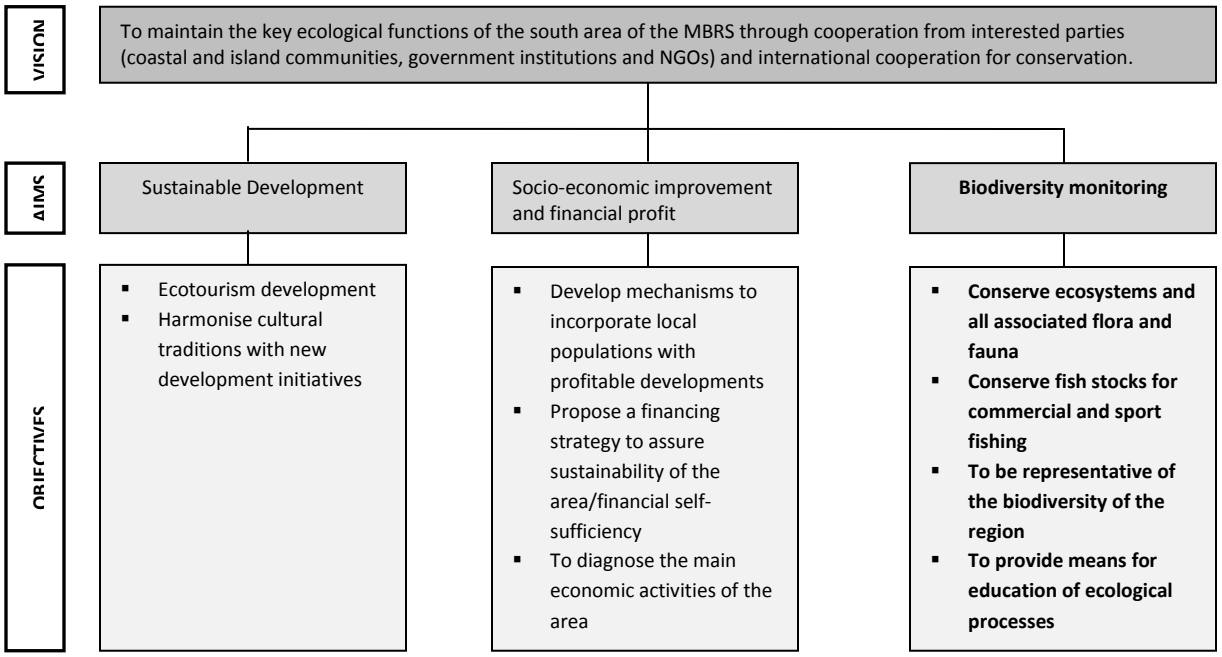

Figure 3.2: Strategic framework highlighting the conservation goals of the CCMPA 2004-2008

were also imposed on the technical capacity and target species of the small-scale fishers. Fishing was only permitted using hook and line, prohibiting the use of gill nets and fish boxes; lobster fishing was only permitted in designated zones during the open season (June-December) using wooden traps, and a minimum tail landing size of 5.5 inches was introduced to protect juveniles; scuba diving for lobster was prohibited, restricting free-diving to shallow fishing grounds; conch extraction was prohibited at all times; and monitoring and enforcement of small-scale fishing regulations by the Honduran Navy was supported by the introduction of HCRF park rangers.

The focus on protection of critical commercial species was supported by the aim of reducing small-scale fishing pressure. The management plan stated intentions to promote alternative livelihood options to reduce the number of fishers dependent on the CCMPA through diversification. Yet there remained significant challenges for management to achieve these conservation objectives. First, small-scale fisheries in the CCMPA were multispecies and multi-gear fisheries, targeting species indiscriminately because of the historical trend of fishing for short-term income or subsistence food. Therefore, diversification of fishing effort to non-commercial species merely shifted the fishing effort to other finfish species. Second, because

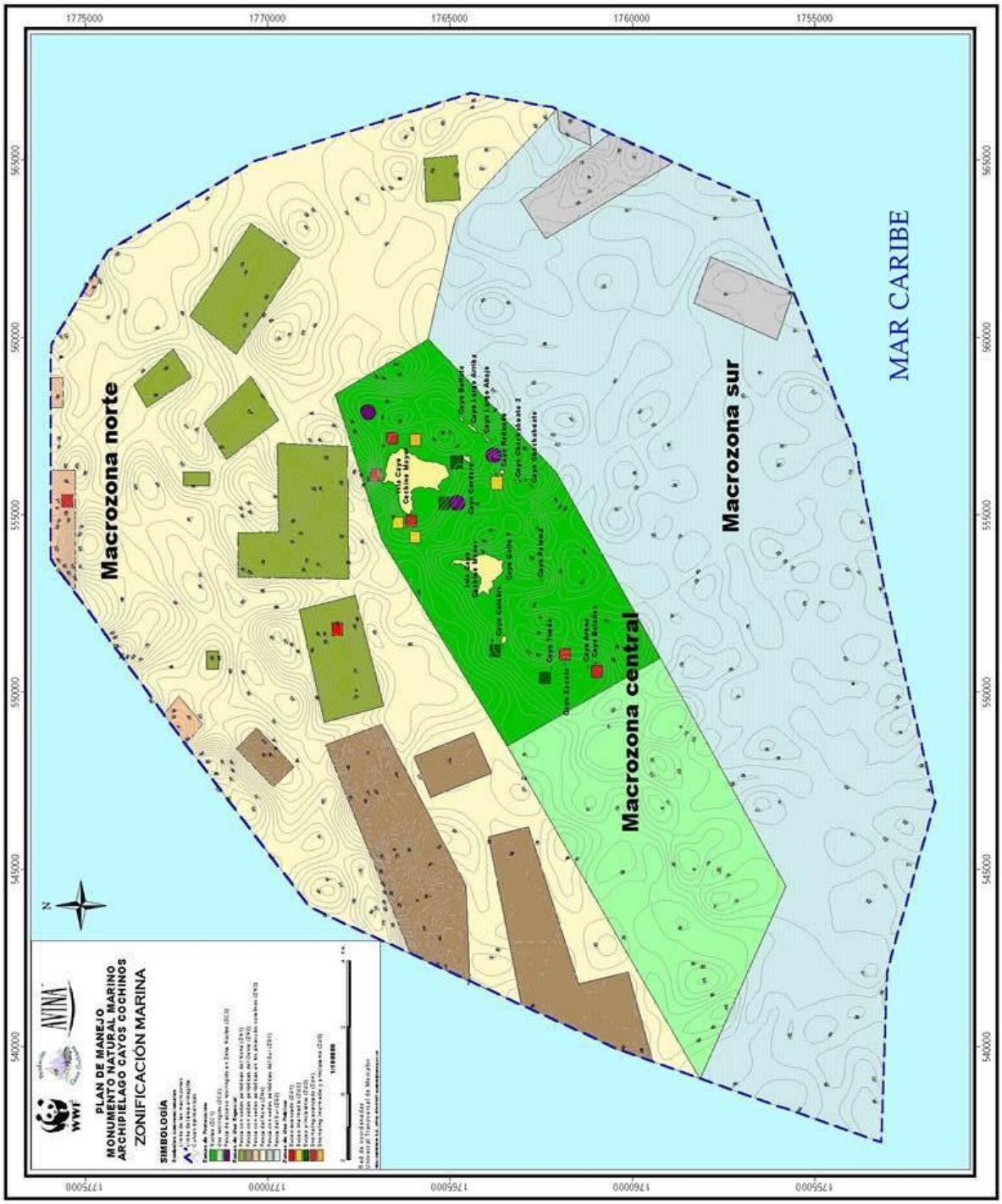

Figure 3.3: Zonificiation of the CCMPA – Zone 1 (NTZ) is coloured green, Zone 2 (closed areas) is indicated by boxes in the areas surrounding the NTZ, and Zone 3 (open access) includes all of the surrounding waters (brown and blue) to the extension of the boundary (Source, HCRF management plan, 2004-2008).

fishing was one of multiple livelihood options rather than a sole occupation, individuals were driven by rational choice to decide when, where and how much to fish. So engagement by the fishers with the social-ecological system was through socio-economic understanding rather than scientific rationale. Third, there were no traditional community-level regulations already in existence on which the HCRF could build to promote conservation and sustainable practices. And fourth, most crucially in this case study, the local communities did not trust the HCRF after the difficulties imposed on them by the STRI's moratorium on all extractive activities. Thus, the first management plan needed to promote both conservation, to legitimise its presence to the local communities, and sustainable local livelihoods, to generate support for the conservation aims.

3.3.1. Scientific knowledge – hegemonic discourse

In order to address the challenges highlighted above for managing the CCMPA, a co-management arrangement would have provided the opportunity to engage the local level resource users with the need to conserve the ecosystem for future sustainability and livelihoods. Yet, in the first management plan the decision-making process was dominated by scientific expert knowledge, driving the conservation discourse towards preservationist strategies rather than the sustainable development ideal that was the original intention of SIEC. The communities were only offered a consultative role through selected representatives (discussed in Chapter 5 section 5.2.4) which limited their involvement in the development of fishing regulations, and fishers' knowledge of the local ecosystem was largely ignored in favour of scientific discourse from external NGOs. Instead, the conservation argument presented a stronger force than the community groups, confronting local fishers with access rights, enforcement and sustainable development, and conservation became the dominant voice in the decision-making process. The resultant effect of such scientific hegemony was that community groups resorted to historical norms and values associated with their traditional assumptions of the social-ecological system. Thus, instead of developing a shared understanding of the system that would have given local users the technical capacity to invoke a more powerful position in the decision-making process, the communities became unwilling to engage with management or conservation. The local ecological knowledge of fishers and local communities is discussed in the next two sections to

explain the way knowledge of the social-ecological system is acquired and legitimised at the local level.

3.3.2. Local Ecological Knowledge (LEK) - Fishers

Knowledge of fishing grounds and techniques in Garifuna communities was mainly learned through experience and then passed on through networks of families and close friends to reinforce social bonds and community territories. In the two coastal communities, knowledge of productive fishing grounds was shared with a small network of family and friends, but the geographical range of the knowledge covered an extensive area along the inshore waters and extending beyond the CCMPA boundaries (Nueva Armenia individual fishers focus group, 19/06/07; Rio Esteban cooperative fishers focus group, 01/07/07). In Chachahuate, knowledge was shared within the whole community because of the much smaller population size, and mainly covered fishing grounds to the north-east of the CCMPA (Chachahuate individual fishers focus group, 12/07/07). Such local ecological knowledge was contained within specific community groups to reinforce the claim to traditional fishing grounds used exclusively by each community. Therefore, detailed LEK (depths, substrate, currents, species life histories) was restricted to the designated areas used by each community, although fishers from all communities were aware of the productivity of fishing grounds used by others.

Individual experience-derived learning generated important information regarding the biology and life histories of target shellfish and finfish species, enabling fishers to select which fishing grounds were appropriate to yield a harvest for the specific conditions at any one time. So fishers were able to draw on a substantial bank of local knowledge to respond to ecological conditions. For example, yellowtail snapper were targeted after times of heavy rain because the fishers believed this species would feed for prolonged periods at the surface. Similarly, great barracuda (*Sphyraena barracuda*) were targeted during periods of rain because fishers believed they would search for food at the surface (Chachahuate individual fishers focus group, 12/07/07).

What drives local knowledge was the connection to fishing as a socio-economic need, generating a mechanism to provide household income and provide a source of food. Although this connection was culturally linked to Garifuna communities through diet, where other livelihood options existed fishing was not pursued as a sole economic activity when conditions were not

favourable. Therefore, fishing activity was dictated by the weather: when the weather was good (May-November) fishers would spend an average of three days a week at sea, whereas during November to February when the weather was poor, fishers would be forced to follow alternative livelihoods. However, more important than influencing fishing effort, natural climate changes were often regarded as the cause for the decline in species abundance in the CCMPA. Fishers in all three communities identified warmer sea surface temperatures as a main factor causing shellfish and finfish species to 'move to areas further north because they're deeper and colder' (Chachauate fisher interview, 17/07/09). Therefore, environmental awareness of changing weather conditions and species abundance was an important influence on the way the social-ecological system was conceptualised by fishers.

Thus, local fishers' knowledge of the social-ecological system and sustainability was driven by the short-term economic needs of the local communities, and the environmental knowledge derived through experience provided information to support this exploitation. Fishing was often concentrated during reproductive cycles at spawning aggregation sites when large quantities of fish could be caught for minimal effort (Rio Esteban individual fishers focus group 01/07/07). Traditional equipment also controlled the experiences of local fishers, concentrating effort in the same community-territory fishing grounds because individuals lacked the technical capacity to target fishing grounds further away. So ecological learning was focused on a relatively small geographical range. Therefore, the introduction of the management restrictions outlined above in section 3.3 created severe conflicts with the local fishers because of their limited geographical knowledge, and without sufficient capacity to expand the fishing range beyond these territories, fishers continued to fish within the realm of their traditional LEK and capacity.

3.3.3. Local ecological knowledge (LEK) – General community

Community-wide LEK was also dictated by experiences with the environment through consumption, species availability and price which correlated with species sustainability. The two coastal communities consumed the largest range of finfish species (Rio Esteban – 28; Nueva Armenia – 31), and the majority of the respondents of the household survey in 2007 admitted to consuming prohibited species despite awareness that these species were protected (Rio Esteban – 68% n=50; Nueva Armenia – 71% n=50). Households interviewed in Rio Esteban were most

aware of the marine environment since 87% of respondents believed that the price of finfish species had increased because they were less available (decreased abundance) than in previous years, and 14% of those respondents also reported that the size of fish available to buy in the community had decreased. In Nueva Armenia, only 51% of respondents stated availability as a cause of the increased cost of finfish in the community, and 3% of those respondents also stated that the size of the fish available to buy had decreased. Yet when respondents were asked what factors could have an impact on the number of fish in the sea, 68% of the respondents in Rio Esteban included small-scale fishing in their responses, and only 34% of respondents included small-scale fishing in Nueva Armenia. The most widely stated influence on the abundance of finfish species was industrial trawling, given by 88% of respondents in Rio Esteban and 65% of respondents in Nueva Armenia. What these responses illustrated was an understanding of anthropogenic stressors to the marine environment, based on the knowledge available to the wider community through availability of different fish species for consumption.

Importantly for management, formal routes of environmental education (Patronato, HCRF, meetings) were limited for the wider community, whereas 100% of respondents in both communities reported that most of their environmental knowledge was derived from either experience or through informal channels (community groups, family, friends). Therefore, perception of the environment was shaped by traditional exchange of knowledge between households rather than through formal education mechanisms. Without access to education, the majority of respondents did not understand the meaning of the terms used by the HCRF to promote conservation and sustainable development, and could not develop a shared understanding of the social-ecological system to fully engage with the management process for the CCMPA and alternative developments.

In Chachahuate, the cayan community that was located inside the CCMPA, community-wide knowledge of the marine environment would be expected to be high because almost all households engaged in fishing activities as part of their livelihood plurality (discussed in Chapter 4 section 4.2.1). Yet, only 60% of the respondents in the household survey (n=20) stated that the higher cost of fish in the community correlated with a decrease in availability, and none of the respondents believed that there had been a change in the size of the fish consumed in the

community, in spite of fishers reporting a general trend that all target species landed were decreasing in size and weight. Moreover, when asked what could affect the number of fish in the sea, only 30% of respondents included small-scale fishing, whereas 80% of respondents believed that natural changes in the weather were the main cause of population decline in the CCMPA. What these responses illustrated was that households in Chachahuate did not accept that small-scale fishing activities were impacting the marine environment, which would have justified the need for enforced regulation.

3.3.4. Conservation monitoring and evaluation

As discussed above in section 3.2, the HCRF relied on external financial support for conservation programmes and alternative development projects. All conservation monitoring and evaluation was conducted by the HCRF to fulfil the requirements of the donor organisations. There were three levels of ecosystem monitoring: 1. A Reefcheck survey conducted every quarter to record general information about the status of the reef and the associated fishery species; 2. an annual AGRRA (Atlantic Gulf Rural Rapid Appraisal) survey to assess the health of the ecosystem in relation to other regional sites using a similar methodology to Reefcheck; and 3. TNC-led protocols to monitor the status of the MBRS conducted every six months (HCRF, KI interview, 21/07/06). However, all that the fisheries data collected was size and abundance of sessile and mobile species, but no annual data was collected to monitor the extraction of species by local fishers. Despite the existence of a national law stating that all extractive activities inside protected areas must be reported to the relevant governing agency, lack of resources to enforce compliance with this law meant that no fishing effort was reported to DIGEPESCA by either the fishers or the HCRF (DIGEPESCA KI interview, 24/07/06). In addition, lack of trust in the HCRF by the local communities meant that self-reporting of catch using log books was not a reliable means of monitoring fishing effort (HCRF KI interview, 21/07/06).

The first management plan stated that after two years of ecological (and social) monitoring, the HCRF would incorporate the new information ‘to adapt and redefine activities for the achievement of conservation objectives as necessary’ (CCMPA management plan, 2004-2008:39). Iterative data collection and evaluation was therefore at the heart of the monitoring

process for management by using community representatives to acquire community-level knowledge of the marine environment. Yet those representatives, who received technical training to be able to understand the social-ecological system in the same manner as the HCRF, did not provide accurate details of the outcomes of management (discussed in Chapters 4 and 5).

Other external organisations, including Opwall, also had agreements with the HCRF to provide ecological and socio-economic monitoring in a reciprocal agreement to have use of the scientific research station on Cayo Menor. Therefore, annual surveys providing information about the health of the reef and associated fish assemblages were made available to the HCRF for use in the decision-making process. Importantly, socio-economic information documenting the impact of the management plan on household level income was also ascertained, as well as indications of the economic success of alternative projects in each community (discussed further in Chapter 4). However, perhaps of the most consequence to monitor the success of the management plan in achieving its conservation objectives was the information collected in this case study of the perceptions of conservation effectiveness held by community households and fishers. These perceptions, combined with analysis of the fishing effort in each community, are presented in the next three sections.

3.3.5. Local perceptions of conservation effectiveness and changes in fishing effort since the introduction of the first management plan (2004-2008)

3.3.5.1. Rio Esteban

The responses from the household survey in 2007 indicated that a small majority (39%, n=50) of the general community did not perceive any change in the health of the CCMPA ecosystem as a result of management restrictions. However, 36% of respondents did perceive improvements to the ecosystem, specifically related to shellfish abundance and removal of marine litter from the environment. A further 25% of the respondents believed that the environment was in a worse condition than it would have been without management intervention, but could not provide further explanation. The respondents who stated there had been either no change or a worsening of conditions correlated with households that traditionally relied on fishing activities as a main part of income. Therefore, perceptions of management effectiveness were driven by socio-economic impacts rather than environmental knowledge.

The perceptions held by fishers in the same community follow a similar trend to the household survey. The focus group held with cooperative fishers (n=8, 12/07/07) found that the support for management and conservation regulations was weak because fishers had not been provided with sufficient livelihood alternatives to alleviate the loss of income from fishing. In particular, fishers did not support the restrictions for lobster diving using scuba equipment as this was a main source of income to fishing households. However, fishers did support the conservation effort in general, recognising that both lobster and conch had become more abundant in the CCMPA since the area was designated as a protected area. Yet this increase was not attributed to the current management plan, but rather a consequence of the moratorium on all extractive activities and consequent reduction in the number of active fishers in the community. Nonetheless, these sample fishers did acknowledge the importance of regulating extractive activities for future sustainability of the fishery, and credited the HCRF for providing educational resources to the community about species reproduction and ecosystem health. So, there was a willingness to engage with and adhere to the restrictions on fishing by recognising the sustainability benefits, but the fishers did not agree with the mechanisms by which the regulations were enforced and their own limited participation in the decision-making process.

Whilst the cooperative fishers in Rio Esteban appreciated the effectiveness of conservation for the abundance of shellfish in the CCMPA, the introduction of the management regulations impacted the fishing effort of the community. By 2007, only 27% of the total landings were taken from areas inside the CCMPA, estimated at 548 kg of finfish using only hook and line. The main species landed was yellowtail snapper (*Ocyurus chrysurus*, 54.3%), Kingfish/Spanish mackerel (*Scomberomorus commerson*, 18.25%) and Graysby grouper (*Cephalopholis cruentata*, 4.87%). All three species are associated with different substrate types, indicating that fishers in this community used different grounds during fishing trips. The fishing effort directed in areas outside the CCMPA reflected the loss of income for fishers in this community because of the restrictions on lobster and conch extraction inside the CCMPA. Lobster fishing remained active in fishing grounds closer to the community, and finfishing effort was re-directed to more distant fishing areas including Roatan Banks and the Bay Islands. Therefore, fishers from Rio Esteban would go to these distant grounds for several weeks, selling produce to markets external to the community. So both shellfish and finfish effort in the CCMPA was reduced in Rio Esteban as a

result of the introduction of restrictions – an outcome which supported the conservation efforts of the HCRF.

3.3.5.2. Nueva Armenia

In Nueva Armenia, 43% of respondents to the household survey in 2007 (n=50) perceived that the CCMPA environment had been improved as a direct outcome of conservation management. In contrast, only 18% of respondents believed that the environment had been worsened because of management regulations, and 38% believed that the management plan had made no difference to the health of the ecosystem. Of those respondents who believed the environment was worse as a result of management, 82% were from low-income households where individual fishers had been impacted by the restrictions. However, interestingly, these respondents were able to cite non-compliance with the regulations as the reason why conditions were worse because these actions undermine conservation efforts.

The perceptions of conservation effectiveness of fishers in the community showed a contrast between cooperative fishers and individual fishers. The focus group with cooperative fishers (n=8, 18/06/07) found that these fishers approved of the management regulations and the HCRF, supported by their perception that lobster and conch stocks were more abundant in the CCMPA since the introduction of the first management plan. This group also did not believe that abundance of reef finfish species had fallen, indicating that these species were not suffering from overexploitation by more focused effort on the hook and line fishery. In contrast, the focus group held with individual fishers (n=8, 19/06/07) revealed that these fishers strongly disagreed with the fishing restrictions, most notably the prohibition of nets and scuba equipment. Although these fishers conceded that the abundance of lobster and conch had increased as a result of the restrictions, they held that the number of active fishers had decreased since the introduction of the management plan.

Based on the landings data collected by the HCRF in 2007, 38% of the total finfish catch in Nueva Armenia was from fishing grounds inside the CCMPA using only hook and line. This indicated that dependency on resources inside the protected area had decreased by 23% since 1993. A total of 771 kg of finfish was caught across all species, comprising mainly of lane snapper (*Lutjanus synagris*, 51.04%) and blue runner jacks (*Caranx crysos*, 12.75%) which are

both associated with coastal reef and sand substrates. The majority of other species caught included estuarine species and whitefish (only for consumption). However, the amount of finfish caught inside the CCMPA in 2007 was only marginally more than the amount caught in 1993 based on fishers perceptions (737.1 kg). Consequently, this indicated that the overall effort for fishing in Nueva Armenia had increased because of improving technical capacity by cooperative fishers, but dependency on fishing inside the CCMPA had decreased. While the geographical range of fishers had expanded, effort was shifted to fishing grounds outside the boundaries of the CCMPA, and this may have future implications for the brood stocks of species found inside the CCMPA. Therefore although the amount of finfish caught inside the CCMPA appeared to decrease, exploitation patterns external to its borders increased in response to the management restrictions.

Nonetheless, the amount of lobster caught from areas inside the CCMPA indicated a marginal increase from pre-CCMPA extractions levels (877.5 kg). This increase was the result of the specially designated lobster area for Nueva Armenian fishers which enabled fishers to concentrate extractive effort on lobster during the open season (June-December). Therefore, socio-economic income was not the main driver for this change in fishing effort by fishers in Nueva Armenia to grounds outside the CCMPA. When the total catch was split into cooperative and individual fishers, those fishers who benefited the most from fishing grounds inside the CCMPA were members of the cooperative, while fishing effort by individuals was concentrated outside the protected area. This reflected the stratification that was created in the community as a result of the introduction of the management plan, and the formation of the Community Commission and community representatives (discussed in Chapter 5 section 5.2.4). Cooperative fishers dominated fishing after receiving motor boats and equipment from the MODAPESCA project[1]. This equipment enabled them to benefit from both technical innovation for fishing and tourism transportation. The project aimed to improve the capacity of small-scale fishers to fish for reef fishes as opposed to lobster, but was only available to cooperative groups in those communities within the Department of Atlántida. As a result, individual fishers found it increasingly difficult to generate income from fishing inside the CCMPA, and instead focused

[1] Small-scale fisheries project sponsored by the Japanese government and administrated by DIGEPESCA.

their efforts on lobster during the permitted months for extraction within the coastal waters in front of the community; and admitted incidences of non-compliance with the conservation regulations for the CCMPA, which is reviewed further in section 3.3.6 below.

3.3.5.3. Chachahuate

In Chachahuate, 60% of households surveyed in 2007 (n=20) perceived that the environment of the CCMPA had been improved since the introduction of the management plan. Yet all of these respondents directly related this improvement to the removal of community rubbish by the HCRF rather than to the extractive regulations. The remaining 40% of respondents believed that the condition of the ecosystem had not changed since the introduction of management regulations. These results indicated a general lack of engagement with the management process rather than lack of knowledge of the marine environment, because the community felt threatened by the presence of a management organisation. These insecurities emerged as a result of historical disputes over the right of the community to remain on the cay, discussed in section 3.3.6 below as a driver for non-compliance with conservation regulations.

Although a focus group with fishers in the community was not conducted in 2007 because of a hurricane evacuation, perceptions of the management regulations were ascertained in a focus group held in 2006. During this focus group (n=6, 25/06/06) a strong dissatisfaction with the regulations emerged. Fishers did not support any of the restrictive measures for conservation, and did not perceive that management was achieving effective conservation of any species. However, fishers did agree with the prohibition of industrial trawlers from the CCMPA which were identified as the biggest threat to small-scale fishing.

Based on the fish landings data collected by the HCRF in 2007, 62% of the total catch landed by fishers in Chachahuate was caught inside the CCMPA using only hook and line. This indicated that the community had become more dependent on fishing grounds in the protected area since 1993. A total of 1024 kg was caught across all target species, comprising of lane snappers (*Lutjanus synagris,* 28.72%), yellowtail snapper (*Ocyurus chrysurus*, 25.16%), white grunts (*Haemulon plumieri,* 17.06%), saucereye porgies (*Calamus calamus*, 11.10%) and graysby grouper (*Cephalopholis cruentata*, 6.44%). Most of these species are associated with patch reefs and sand which dominate the substrate of the community's fishing grounds within the CCMPA.

Yellowtail snapper are found in deep reef areas, more frequently found in the northern boundary of the CCMPA, and in the deep waters of the Roatan Banks further north of the CCMPA. Therefore based on fishers' perceptions, the amount of finfish caught from inside the CCMPA was two and a half times the amount caught before the designation of the protected area. Correspondingly, the amount of lobster caught from inside the CCMPA in 2007 was approximately 350 kg, half the amount caught in 1993. These results suggested that fishing effort had shifted from lobster and conch (prohibited) to finfish species, and a very large amount of finfish was necessary to equal the loss of income from lobster.

The combined landings data for Nueva Armenia and Chachahuate in 2007 indicated that three species were considered overfished using FishBase[2] to calculate exploitation rates – yellowtail snapper, kingfish and bonefish, and both white grunts and Spanish grunts were borderline overfished (Table 3.2). The remaining species were classed as sustainable, but were also the least targeted species by fishers in these communities (with the exception of lane snapper). However, none of the species considered overfished in 2007 were extracted to levels that would have categorised them as overfished in 1993 when lobster and conch were the main target species in the CCMPA fishery. Therefore, the above results indicated that the increased finfish effort following the introduction of regulations for the extraction of shellfish species resulted in overexploitation of the most valuable reef fish species.

3.3.6. Drivers for non-compliance with conservation-based regulations

The evidence presented above indicated that overall (with the exception of Chachahuate) fishing effort inside the CCMPA from all communities had been reduced both in the number of fishers and amount of catch. Therefore, the HCRF were achieving their aim of reducing the fishing pressure inside the CCMPA, one of the original intentions of the management plan. Yet this reduction in fishing pressure was not achieved by a shared understanding of the need for conservation, but as a result of the decreased ability of fishers to maintain livelihoods dependent on fishing. Without this conservation understanding, in times of socio-economic need fishers will return to the fishery to generate 'fast cash' without knowing the conservation regulations and are

[2] FishBase is a relational database of global information on fishes developed at the WorldFish Centre in collaboration with the Food and Agriculture Organisation of the United Nations (FAO).

Table 3.2: Main target finfish species composition of artisanal fishers in Nueva Armenia and Chachahuate in 2007. No differentiation available between percentages of each species caught from grounds inside or outside the protected area. Key: Overfished species, borderline overfished, sustainable.

Main catch species	% catch Nueva Armenia	% catch Chachahuate
Yellowtail snapper (deep reef)	1.32	25.16
Kingfish (reef, clear waters)	2.82	0.40
Bonefish (estuary, mud)	3.11	-
White grunt (patch reef, sand)	0.78	17.06
Spanish grunt (reef, sand)	1.04	0.51
Lane snapper (reef, sand)	51.04	28.72
Saucereye porgy (reef, sand)	0.89	11.10
Blue runner jack (coastal, seagrass)	12.75	1.36
Graysby (reef, seagrass)	2.94	6.44
Coney (reef)	-	1.16
Sea trout (estuary)	4.06	-
Whitefish	9.18	0.54
Total % of catch	89.93	92.45

vulnerable to enforcement measures. Loss of income was the main driver for non-compliance stated by individual fishers in Nueva Armenia who felt that they had been disadvantaged by the regulations of the management plan:

> *'What are people going to do; there is no source of work. It's prohibited to dive, no industrial fishing, no artisanal fishing with nets. Until the lobster season has opened [August-October] there is no source of work. People have families to feed. If they offered a job for the time it's closed we'd do it and work, if they don't offer when people have children they will steal to feed them.'* (NA individual fishers' focus group 19/06/07).

Coupled with this socio-economic dependency on fishing, problems with enforcers were also stated as a driver for non-compliance by individual fishers in Nueva Armenia and all fishers in Chachahuate. These individuals perceived that they were being targeted by Navy personnel regardless of the legality of their equipment or catch, leading to non-compliance with regulations at night to avoid detection:

> '*What else are we meant to do? They (Navy) come after us whatever we're doing and take everything away. If I go out at night I can do what I want and they won't know'* (Nueva Armenia, individual fishers focus group, 19/06/07).

Collectively all fishers (cooperatives and individuals) agreed that community-based enforcement would achieve better compliance than the current State-sponsored system because it would promote community cohesiveness, improve environmental understanding and knowledge, and reduce competition between fishers within and between communities. Instead, marginalised individuals felt targeted by the enforcers, and that power had been given to cooperative fishers.

What this non-compliance demonstrated was that to achieve better community-level compliance with conservation regulations, there needed to be a clear economic future in fishing demonstrated to the local user groups. Palacio *et al* (2006) found that by guaranteeing an income from small-scale fishing, Garifuna communities dependent on a marine protected area in Belize remained close to their environment and learned how to understand it and manage it sustainably for themselves. They suggested that without continuous use, individuals would disconnect from their local environment, leading to neglect for the wider ecosystem and consequent non-compliance with conservation regulations because understanding for conservation would be lost.

Palacio *et al's* (2006) findings would indicate that the original intentions for the first management plan to reduce the number of fishers in the CCMPA fishery would have been the root cause for non-compliance with the regulations, because the socio-economic impacts were not sufficiently alleviated by alternative livelihood options. However, compliance with conservation regulations by improving the technical capacity of the small-scale fishers was recognised by DIGEPESCA stating that '*small-scale fishing is not a problem, but there is no opportunity to modernise the production'* (DIGEPESCA KI interview, 03/08/06). Yet

DIGEPESCA was not involved during the decision-making process of the first management plan, and so had no influence on the outcome of the regulations.

Non-compliance with fishing regulations was further exacerbated by the stratification of knowledge between cooperative fishers, as community representatives, and individual fishers. Representatives were funded to participate in workshops and events to improve their technical understanding of management, widening their environmental knowledge beyond the local-scale. Yet this knowledge was not shared with other local resource users, but was instead used to promote personal wealth and status within the communities. This was most prevalent in Nueva Armenia because it received the most attention from the HCRF and other sponsors to promote alternative livelihoods (discussed further in Chapter 5 section 5.2.4.2). Without access to this environmental knowledge, shared understanding of the conservation aims for the CCMPA was not developed by individual fishers, and socio-economic needs prevailed over conservation. As a result of this knowledge stratification, individual fishers were unwilling to share their ecological knowledge or participate with fishing surveys because they feared the information 'would be used against them' by the HCRF (Rio Esteban, Cooperative fishers' focus group, 12/07/07). This reinforces the need for reciprocity and information exchange between different stakeholders in the management system to promote collective action for conservation.

Non-compliance with conservation and management by fishers and the general community in Chachahuate can also be linked to the struggle for recognition as the owners of the title deeds to the cay. The rights of the community to remain on the cay are connected to the historical permission to inhabit the cay for the duration of the fishing season. The settlement was only supposed to be a temporary dwelling, but over time it has evolved into a permanent (and expanding) community. Having been awarded the title deeds to the cay in 2006, this claim has since been disputed by Robert Griffiths in the belief that he was/is the rightful owner. The HCRF worked on behalf of Chachahuate to gain the ownership rights to the land, but since this has been contested the community have not cooperated with any meso-scale/authoritarian organisation, and have defended their fishing rights of access as a mechanism to preserve their historical right to remain on the cay (OFRANEH, KI interview 28/06/09).

3.3.7. External events

The CCMPA as a social-ecological system was vulnerable to exogenous inputs from social, economic, political and ecological forces that crossed the boundaries of the protected area. These forces were often generated by events that are not within the immediate sphere of management, but have required management adaptations to account for their impacts. Two such phenomena that have been influential on the management process of the CCMPA were of natural (hurricane) and socio-political (reality show) origins.

3.3.7.1. Natural phenomena

Fishing and conservation in the CCMPA have been affected by natural biophysical phenomena that impacted the resilience of the social-ecological system. In October 1998, Hurricane Mitch struck Honduras and Nicaragua causing floods and land-slides in coastal areas and damaged the infrastructure of the north coast of Honduras. Most significantly for the CCMPA, the hurricane caused physical damage to the reefs in the north-east areas of the protected area (Andraka et al, 2004). In exposed patches, coral reefs were turned to rubble, damaging the complexity of the reef to support a healthy ecosystem. These damaged areas included fishing grounds used by all three communities, thereby reducing the number of productive fishing grounds available.

Also in 1998, during September and October many of Honduras' reefs experienced a severe coral bleaching event that affected 43% of the reefs inside the CCMPA (Andraka et al, 2004). These bleaching events caused mass mortality of the reefs and increased the prevalence of further diseases. While it has not been directly studied, it is believed that these two events have reduced the number of reef shelters that function as fish and lobster refugia (Hoegh-Guldberg, 1999), which would have an impact on the abundance of both species within the CCMPA. Furthermore, Russell (2005) reported that resulting sedimentation, pollution and agricultural run-off from the mainland had also decreased fish stocks in the protected area. While these were of anthropogenic origin, all three impacted the biological composition of the reef ecosystem through algae growth and mud plumes from the river estuary. The damage caused by both the hurricane and mass bleaching were taken into consideration in the first management plan, furthering the cause for preservation of the area to maintain vital ecosystem services.

3.3.7.2. Socio-political phenomenon

More recently than the biophysical phenomena, the reality show 'Survivor' was filmed inside the CCMPA to raise both financial capital for the HCRF and the tourism profile of the CCMPA. Eight shows were filmed between 2006 and 2008 which generated substantial revenue for the HCRF, as documented in Chapter 4 section 4.6. However, the reality shows also caused a socio-political backlash because the production contravened many of the conservation regulations established in the management plan. Although an environmental impact assessment (EIA) was undertaken it was not enforced, and the same regulations were still compulsory for the local communities:

> *'Well, there are regulations they're supposed to follow, but they make their own rules. It's forbidden for locals and tourists to get bait, disturb nesting sites etc…., but with them it's all about the money. The Foundation issue the permits for the boats etc…and supply the facilities. But they're renting one of the cays for 3 months from September, saying it's a documentary about local fishermen, but it's actually celebrity Love Island!'* (HCRF KI interview, 05/09/06).

The filming of the first reality show caused some ecological damage to the reef structure around Cayo Timon where the show was based, with additional damage to the seabed caused by the laying of heavy duty transmission cables (HCRF KI interview, 26/07/07). However, the production company was simply fined as compensation for the damage on the basis of the 'polluter pays' principle. In spite of the damage caused by the original production, seven subsequent shows were filmed in the CCMPA, though these were subjected to much stricter environmental controls. Nonetheless, it was not the ecological damage that was instrumental for making changes to the management plan during the revision stages. It was the leniency accorded to the production company over their breach of conservation regulations that produced the socio-political response from the local communities that was the main driver for change. The result was a second management plan that responded to socio-political pressure without sufficient evaluation of the biological condition of the CCMPA, which is discussed in the next section.

3.4. Second management plan (2008-2013) – 'politics with limited ecology'

The socio-political implications for the revision of the management plan coincided with the introduction of an adaptive co-management regime, designed to be more responsive to local-level knowledge and monitoring of the social-ecological system. The conservation regulations were changed in the second management plan in response to the socio-economic difficulties experienced by the local communities as well as the controversy created by the reality show. The HCRF claimed that 'big changes' had been made to the extraction controls for small-scale fishing including new zoning (Figure 3.4, on next page), a smaller no-take zone only around Cay Menor to protect a spawning aggregation site (SAS) for grouper and yellowtail snapper, four further SASs for grouper and yellowtail snapper, and a proposed extension of the CCMPA southern boundary to the mainland (due to be effective in 2011) (HCRF KI interview, 08/06/09). Additionally, the reality shows were written into the management plan to specify areas for production that would not coincide with community fishing grounds. Yet, in reality, the conservation objectives were not significantly altered in the second management plan (Figure 3.5).

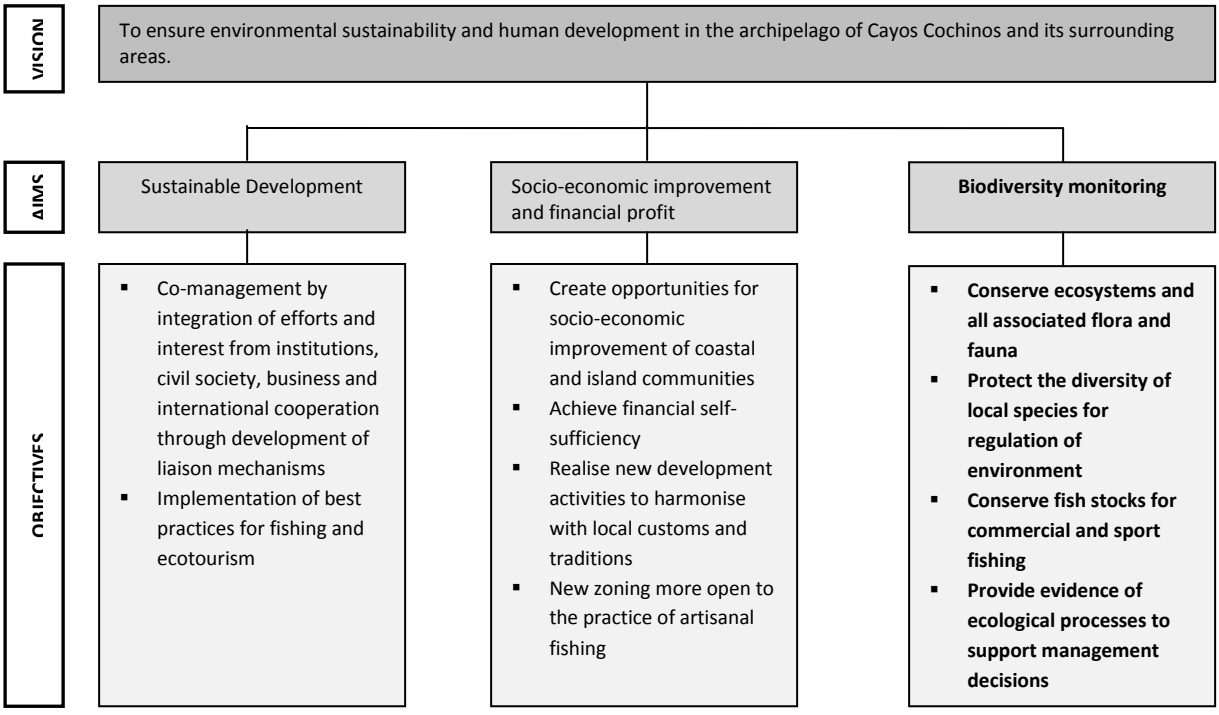

Figure 3.5: Strategic framework highlighting the conservation goals of the CCMPA (2008-2013)

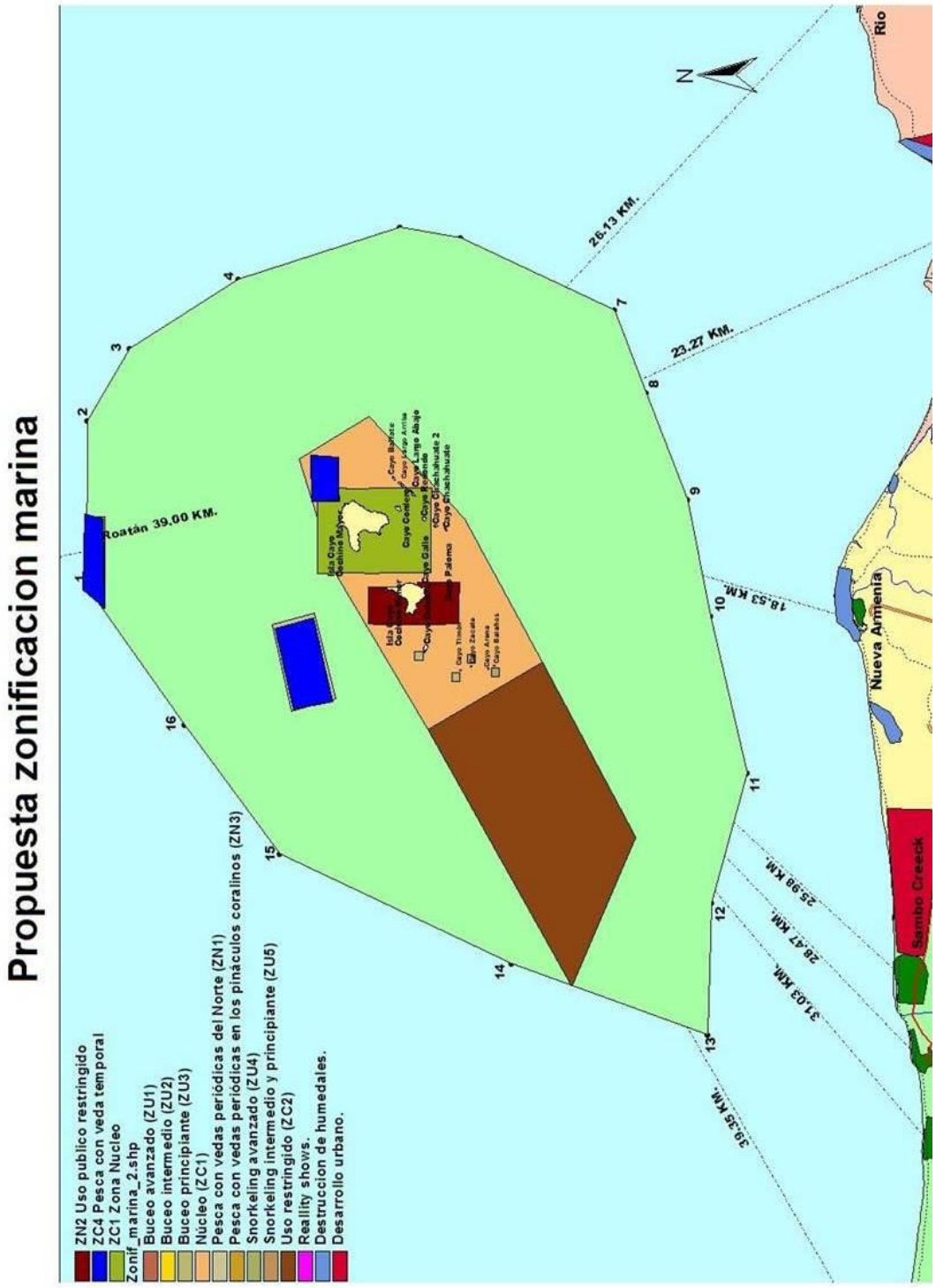

Figure 3.4: Proposed zonificiation of the CCMPA – Zone 1 (NTZ) is coloured brown, Zone 2 (closed areas) is indicated by blue boxes, and Zone 3 (open access) includes all of the surrounding waters (green) The proposed boundary extension is not shown (Source, HCRF management plan, 2008-2013).

A critical difference in the development of the new management plan was the involvement of more stakeholders in the decision-making process, expanding the governance system of the CCMPA beyond the managerial isolation of the original co-management arrangement. Importantly for small-scale fishing, the TNC (sponsoring the second management plan) wanted to '*diminish the pressure on fishers'* (TNC KI interview, 03/07/07). So local-level knowledge and information was incorporated into the decision-making process to look at the development of alternative livelihoods that would be more culturally appropriate.

The second management plan created more grounds that were opened to access by fishers, although no changes were implemented to gear and target species restrictions. However, other NGO stakeholders in the decision-making process criticised the second management plan for being too socially-driven and not incorporating available ecological data into the decision-making process, which weakened the conservation objectives of the CCMPA:

> *'The second management plan has got big gaps, for a start the science that Opwall have been collecting. That information is never included in the plans, so the science is not up to date. Some information is even the same as the first plan. There was reef fish ecology included in the first plan, but it's not included in the second. Being part of the committee I know who collected the information, and it was one person, it's not all of the necessary information but it's some'* (WWF KI interview, 16/07/09).

3.5. Local perceptions of conservation effectiveness and changes in fishing effort since the introduction of the second management plan (2008-2013)

3.5.1. Rio Esteban

The household survey in 2009 (n=34) found that environmental awareness and knowledge of the CCMPA at the general community-level had remained fairly similar to the results of the household survey in 2007. While 44% of respondents stated that the environment of the CCMPA had been improved since 2007, of these respondents only 36% were aware of any changes that had been implemented in the second management plan. More significantly, 50% of respondents believed that there had been no change in the health of the CCMPA since the introduction of the second management plan. Yet environmental knowledge of factors that could affect the

abundance of fish had increased, with 76% of respondents identifying human-based activities as having negative impacts on the marine environment, including industrial trawling, small-scale fishing, pollution and farming. This increased understanding of the local ecosystem was attributed to information given to respondents by external NGOs working in the area (GAD, WWF, Life Foundation, ODECO) as well as a renewed focus for the environment and sustainable development by the Municipality of Colon. While this increased environmental awareness supported the conservation objectives of the CCMPA by conserving the wider terrestrial-marine ecosystem, it also undermined the HCRF because the general community were disconnected from both the management process and the marine resources.

In contrast to the focus group conducted with cooperative fishers in 2007, the individual interviews in 2009 found that the general trend was towards much greater support for the HCRF and the conservation objectives for the CCMPA. All respondents (n=4) stated that they strongly agreed with the new management plan, and believed that they had benefited as a result of the changes. However, these fishers had been present during the management plan revisions and were also beneficiaries of the alternative development projects focused on fishers in the community. Therefore, having received socio-economic support from the HCRF and other external organisations (Opwall, WWF, US AID, GAD), fishers now had another source of income which allowed them to be more open to the conservation regulations in the CCMPA.

The amount of finfish extracted from inside the CCMPA (valued at 60% of total catch) also remained fairly constant between 2007 and 2009. Landings data was not available in 2007 so the amount of finfish (kgs) is unknown. Yet from the fishers' interviews, the species composition of the catch had not changed. The main target species remained yellowtail snapper (58.3%), Spanish mackerel (15.7%) and grouper. On an average day, fishers reported that they would land up to 50 lbs of finfish, which aggregated to 2340 lbs/1053 kgs per fishing season. This suggested that fishers in Rio Esteban had increased their catch two-fold after the introduction of the new management plan. Interestingly, the number of households that included fishing as part of the livelihood strategy decreased in 2009, but the CPUE of fishing increased. This implied that reduced competition for resources benefitted those fishers remaining active, an explanation that was supported by the HCRF:

'*There are certain times for productive activities, and if you assign some time to tourism then its time taken from fishing, but we don't have the data to prove that. But we can assume if some fishermen are in tourism then that is time taken out of fishing*.' (HCRF KI interview, 16/08/09).

3.5.2. Nueva Armenia

In Nueva Armenia, the household survey (n=37) found that 56% of respondents believed that the new management plan had made no difference to the health of the CCMPA ecosystem, while the remaining 44% stated that conditions had worsened since the new plan was implemented. However, these respondents corresponded to households that reported that their income derived from either fishing or tourism had decreased since 2007. Therefore, these respondents were conceptualising the status of the environment through socio-economic deprivation. Importantly for management, this community was no longer the focus of sustainable development after 2007 following a lack of delivery to manage and further develop community projects. Therefore, environmental education was restricted to experience, informal networks and schools.

A similar trend emerged from the individual fishers' interviews (n=8) which found that all respondents believed that their catch and income had decreased as a result of the new management plan. A full 100% of respondents also stated that they had a poor relationship with the HCRF and did not support the regulations for managing the CCMPA. Only 32% of catch was reported to be taken from inside the CCMPA, though this was a marginal decrease from 2007. Fishers reported that an average of 50 lbs of finfish would be landed on a given day, equating to 2340 lbs/1053 kgs of finfish per season, which is an increase of 27% in catch from inside the CCMPA despite a reduced effort. Therefore, a similar explanation could apply in this community as outlined above in Rio Esteban, that fewer active fishers reduced the competition for resources.

3.5.3. Chachahuate

The household survey in Chachahuate (n=11) found that 62% of respondents believed that the CCMPA environment had been improved as a result of the second management plan, a very similar level to the survey conducted in 2007. However, one important difference emerged – respondents identified improvements in the abundance of shellfish as a result of management.

While this reason showed a time-lag between the first management plan outcomes and recognition by the general community, it also importantly illustrated a willingness of the community to engage in the management process.

Furthermore, the fishers interviewed in 2009 (n=8) were all supportive of the conservation objectives for the CCMPA, and recognised that populations of both lobster and conch had increased as a result of management. Yet there was a continuing dissatisfaction with the level of restrictions imposed on fishing grounds inside the CCMPA. In particular, fishers who were most reliant on lobster (n=5) for their income strongly disagreed with the prohibition of scuba diving despite the increased availability of lobster grounds that had previously been closed in the first management plan. The level of catch taken from inside the protected area decreased to 28% in 2009, a reduction of 34% since 2007. The catch species composition was relatively similar, comprised mainly of snappers (36.87%) and white grunt (11.3%). However, the rest of the fish caught inside the CCMPA was all whitefish species, used only for consumption rather than sale. Thus, fishers in Chachahuate were not dependent on the resources of the CCMPA for trade, but did extract finfish for subsistence. Accounting for this increased catch rate of whitefish, fishers reported that on an average day they would land 50 lbs of finfish from inside the CCMPA. This would equal 3900 lbs/1755 kgs of finfish in a typical fishing season, substantially more than in 2007. However, only 842 kg of this catch would be sold (48%), which indicated that fishers had become less dependent on the CCMPA for income. Effort reduction inside the CCMPA was not a consequence of management restrictions, but was attributed to the natural movement of target fish species to cooler and deeper waters beyond the northern boundary of the protected area.

3.5.4. Drivers for non-compliance with conservation-based regulations

Non-compliance with regulation and enforcement continued to be an issue for individual fishers in Nueva Armenia after the implementation of the second management plan, driven by socio-economic needs and clashes with enforcement. Individual fishers recognised that the HCRF had tried to change the regulations in recognition of their needs, but believed that the changes had mainly benefitted the cooperative fishers:

> *'they have identified some but not all of our needs, so we receive some help, but it's very directed by the Commission and what they think we need'* (NA fisher interview, 15/07/09).

Illegal fishing practices and non-compliance were also still a problem for fishers in Rio Esteban. Yet in 2009, the cooperative fishing group demonstrated signs of having developed community-level controls and sanctions for non-compliance. One member of the group had reportedly caught a shark from inside the CCMPA, which was prohibited in the management plan but of high value when sold at market. This individual was forced out of the cooperative for a period of six months, when he was unable to benefit from the collective revenue generated by fishing or through alternative options (mainly tourism). After this period, the fisher was allowed to return into the community group on a probationary caution that any further infractions against the conservation regulations would result in permanent expulsion from the group. Thus, fishers in Rio Esteban developed self-regulation mechanisms for extractive activities through a sense of ownership of the CCMPA, and increased interaction with the process of management. While this had yet to develop a shared understanding of the CCMPA and problems for conservation, it demonstrated a willingness to engage with the environment to conserve resources for future livelihood sustainability. In this way, it is hoped that the second management plan would generate better compliance with regulations by improving environmental knowledge through society-nature interactions, following the MBRS regional model for community participation:

> *'In Mexico the fishermen are involved and do the monitoring, so they're more concerned about conserving the area and protecting it. They understand why they need to protect spawning aggregation sites'* (WWF KI interview, 16/07/09).

However, technical scientific discourse was still prevalent during the revision meetings, preventing the community representatives from being able to conceive of the social-ecological environment in the same technical realm as meso-scale stakeholders. Thus community representatives were able to change the regulations of the management plan based on socio-economic needs rather than through the development of a shared understanding of the social-ecological system. Therefore, information about ecosystem did not get passed down to the

general community because no environmental learning had occurred. During the revision stages, the HCRF held a series of community-based meetings to inform local user groups of the conservation aims of management. These meetings were responsive to political needs, and maintained a scientific discourse that dictated the mechanism for dissemination of information to the community-level:

> '*The communities always say they know nothing, and it's true that the foundation do have lots of meetings in the communities, but in the end all the documentation is for a specific audience….The Cayos Cochinos have finished the management plan, but it's been published in such an inaccessible way'*. (WWF KI interview, 16/07/09).

Without engaging with the perceptions of the social-ecological system held by the local communities, conservation understanding and compliance was undermined by societal shifts that pushed communities away from dependency on natural resources, and towards non-traditional livelihoods. Thus environmental knowledge and more importantly interest in the environment was being lost as community youth did not participate in fishing. Youth disengagement with fishing was supported by the experiences of the practicalities of fishing and the socio-economic difficulties encountered by their (fishing) parents (aged 35-65) which resulted in encouragement for their children to pursue other livelihood options. As a result, historical and current environmental knowledge, cultural traditions and local livelihood based on fishing are all becoming unsustainable. This will have serious implications for future management and conservation of the CCMPA as local communities use and engage with the environment less.

3.5.5. Regional coordination

The conservation efforts of the HCRF were assisted to a greater extent in the second phase of management than in the first through more effective coordination at the meso-scale between regional environment organisations. Yet all stakeholders involved in the decision-making process to create the second management plan perceived the CCMPA, and its problems for management, through the lenses of their organisation's values and assumptions for conservation or sustainable development. So SERNA and ICF (formally COHDEFOR) understood the environment of the CCMPA in terms of the human-nature interactions for sustainable livelihoods, whereas the TNC perceived the CCMPA in terms of SASs and its regional

representativeness of the MBRS. However, ICF introduced a nationally-enforced monitoring and evaluation of all protected areas in Honduras in 2009 (ICF KI interview, 10/06/09). This process brought the different stakeholder perceptions of the environment closer together because the evaluation process was based on peer-review of co-management systems. Through this process of evaluation, each stakeholder was forced to understand the role of others in the management process, developing a wider understanding of the social-ecological system. Although this evaluation did not develop shared understanding to the extent that it would challenge the assumptions held by different institutions, it did serve as a link between different stakeholder levels to open the channels for conservation and sustainable development communication. In addition to this annual review process, devolved government agencies also began to coordinate their activities to improve the conditions of localised environments within regional Departments. Through this coordination, SERNA and Municipal environmental offices started to provide local-level environmental education about the importance of natural resources to promote sustainable developments. This was sponsored by other agencies, included the HCRF, to provide locally-specific community education to improve compliance with conservation measures.

3.6 Ecotourism for improved conservation

As a mechanism to provide alternative livelihoods and decrease fishing pressure in the CCMPA, ecotourism projects were implemented in all three case study communities, supported by funding from external agents working in the region (Opwall, WWF, GAD, TNC). The aim of these ecotourism projects was two-fold: 1. to provide an alternative source of income for fishers after the introduction of fishing regulations; and 2. to improve community understanding of their environment and promote environmental responsibility. Ecotourism was defined in the first management plan as ‘conservation and protection of the natural resources in the protected area’ by applying the concept of ‘without a trace’ aiming that tourism would leave no trace on the environment. The original intention of ecotourism was to accommodate day-tourists in local restaurants, whilst employing fishers as boat captains for the transportation of tourists. Day tourism would encourage local-scale businesses whilst actively discouraging the construction of tourist infrastructure in the area (CCMPA management plan, 2004-2008). Whilst infrastructure development could be regulated inside the CCMPA, no controls existed for coastal development.

Therefore, successful ecotourism in the two coastal communities would help to prevent the construction of mass-tourism developments that had been occurring along the northern coast (as discussed in Chapter 1 section 1.2.1).

Ecotourism projects in the two coastal communities were explicitly developed to provide alternative livelihoods for fishers, and as such excluded benefits from being distributed to the whole community. While secondary benefits are generated for the wider community through sales of local products, the development of ecotourism projects created stratification between cooperative fishers and individual fishers (discussed in further detail in Chapters 4 and 5). In addition to the differences in income associated with the projects, there were also significant differences between the understanding of ecotourism between cooperative fishers and all other groups in the communities. The cooperative fishers in Nueva Armenia understood ecotourism in the same terms as the HCRF, reflecting their exposure to the discourse for ecotourism-based sustainable development ('*ecotourism means that tourists don't leave anything behind and help us to protect the Cayos',* NA Cooperative fishers' focus group, 28/07/07). Yet, only one individual fisher shared this understanding of ecotourism (n=8, 18/06/07) but also believed that only cooperative fishers benefitted from such projects. Critically for the success of ecotourism and conservation, these projected needed to generate community-wide understanding to reduce the level of non-compliance. However, in Nueva Armenia, the focus on cooperative fishers for alternative developments served to promote non-compliance. In addition, only 33% of household respondents (n=50) shared the same understanding of the term. The majority of respondents (45%) believed that 'ecotourism' was keeping the community clean, while a further 12% understood the term to mean deforestation. Therefore, a divergence of understanding emerged based on levels of interaction with the HCRF.

The success of ecotourism was greater in Chachahuate than the coastal communities because of the higher levels of tourism inside the CCMPA. Here, 64% of respondents in the household survey in 2007 (n=20) demonstrated an understanding of ecotourism, corresponding to households directly including tourism in their livelihood structures. As such, interactions with the environment through ecotourism projects were much greater which generated conceptual understanding of the idea of 'tourism without a trace'. Additionally, to preserve the pristine

environment for tourism on the cay, the HCRF provided litter barrels and a fortnightly collection. Therefore, tourism and removal of litter (no trace) were clearly evident to members of the community. Yet, ecotourism remained bound to the community's immediate surrounding through these visual associations rather than a more holistic environmental understanding. As such, ecotourism became part of the livelihood structure in Chachahuate, alongside fishing rather than as a replacement. However, ecotourism developments did improve community-wide connection to the environment by incorporating women, as well as fishers, into alternative projects.

3.7. Conclusions

The management of the CCMPA, under both CM and ACM regimes, was designed to promote conservation of the ecosystem and associated flora and fauna, with only secondary objectives to maintain local livelihoods without compromising the cultural traditions of the Garifuna. Yet restrictions (gear, closed areas, species prohibitions) were introduced without adequate monitoring of the effectiveness of conservation or the impact of the small-scale fishery to justify these restrictions. In addition, lack of shared understanding between the meso-scale stakeholders and the local communities prevented fishers from developing a sense of conservation importance to maintain a sustainable fishing-dependent livelihood. Instead, fishing effort was shifted to target finfish species inside the CCMPA, while lobster and finfish were extracted in areas outside the CCMPA. Thus, the conservation-based restrictions for the CCMPA achieved conservation of shellfish species inside the protected area, but created significant pressures on certain finfish species.

This change in fishing effort resulting from the designation of the CCMPA and subsequent management plans, also had implications for the surrounding areas as fishing effort was concentrated in grounds external to the protected area. Therefore, while the conservation measures could protect the species associated with specific reefs inside the CCMPA, it also became exposed to external pressures for brood stock reproduction that support the reproductive capacity of the CCMPA. Without a coordinated regional level agenda for conservation, the HCRF could not achieve effective conservation in isolation.

In the context of the CCMPA, the co-management arrangements delivered effective conservation of shellfish with the support of those fishers involved in the management process, which adheres to the principles of participatory governance. Yet, the distribution of the benefits of conservation and associated alternative livelihood projects was not equitable within communities or between communities. The socio-economic impacts of these conservation measures will now be discussed in the next chapter.

CHAPTER 4: SOCIO-ECONOMIC VARIABLES AS AGENTS OF CHANGE FOR PARTICIPATORY GOVERNANCE IN THE CCMPA

4.1. Introduction

The positive and negative impacts of marine protected area management on the socio-economic structures and livelihoods of local community user groups are well documented (Brown et al, 2001; Jones, 2001; Sala et al, 2002; Scholz, 2004). To achieve successful co-management, the benefits to individuals at the community-level must exceed the costs of participation in and compliance with the investments associated with the arrangement (Pomeroy et al, 2004). However, relatively little is known about the relationship between the socio-economic well-being of local communities and subsequent participation in the process of co-management, specifically levels of interest in, acceptance of, and willingness to be involved with management. This chapter will test the hypothesis that significant socio-economic impacts (be they positive or negative) will generate greater involvement of local user groups to change the rules of management, than a system that has relatively little socio-economic impact. In a co-management/adaptive co-management regime, the wider the socio-economic impact of management upon local fishers and community livelihoods, the greater the level of feedback into the management system to enable adaptation to occur.

Further, less tangible, factors affecting ACM in areas of small-scale fishing activities are economic inequality and distribution of wealth between local user groups, power relations within community groups, exclusion or access to resources for local users, access to participation with the management process and local cultural preferences. Therefore management of natural resources should be designed around the specific local socio-economic conditions of the dependent communities to understand which socio-economic variables can re-organise the process of management. Additionally, socio-economic resilience and adaptability are key outcomes of neoliberal conservation reforms, redeveloping the society-nature relationship in the form of ecotourism. In this chapter I will review and discuss the socio-economic impacts for local livelihood sustainability of both management cycles under management decentralisation and neoliberal reforms, and present the implications for compliance and participation with management. The following research questions will be addressed:

- Has the sustainability of local community livelihoods been enhanced by co-management and/or adaptive co-management?
- Which socio-economic variables have influenced the process and outcomes of adaptive co-management in the CCMPA?

First an economic overview is presented of each study site detailing historical dependency on CCMPA resources and livelihood diversity. Socio-economic strategies of both the first CM-based management plan (2004-2008) and the second ACM-based management plan (2008-2012) are then outlined. Resource dependency and livelihood diversity are then compared and contrasted during these two management cycles to assess the socio-economic trends for fishers as the main group impacted by management in each community as drivers for participation in the management process. Finally macro (decentralisation, neoliberal sustainable development), meso (external funding) and micro (cultural traditions) scale variables that have influenced the process of management in the CCMPA are examined, the resultant outcomes of the revision of the management plan in 2007, followed by chapter conclusions.

4.2. Socio-economic profile of communities

To a non-Garifuna, on first appearance there are obvious differences in the relative wealth of the three communities based on infrastructure, services and material possessions. The two coastal communities (Rio Esteban, Nueva Armenia) were much larger; Rio Esteban had an estimated population of 4000 inhabitants, and Nueva Armenia had an estimated population of 5000 inhabitants[1]. Their coastal locations granted them provision of municipal services (electricity, potable water supply, elementary and secondary schools, health centres, community centres) and the majority of housing had concrete walls with tin or tiled roofs, constructed to accommodate the household with multiple bedrooms and an indoor bathroom. By contrast, the cayan community (Chachahuate) is much smaller with a permanent population of only 90 inhabitants,

[1] Population approximations are taken from the Office of National Statistics National Census (2001) and corroborated with data collected during interviews with community leaders (2007, 2009).

although this increases to 200 during the fishing season[2]. Despite being classified as terrestrial land within the Municipality of the Bay Islands, there was no provision of municipal services. All potable water was collected by residents and transported by boat from Cayo Mayor (the larger of the two islands inside the CCMPA) to Chachahuate. Electricity was produced by a generator for two hours every night with the fuel costs being paid by the community themselves. There was some assistance from the HCRF, who maintain a garbage collection service every fortnight. All housing was of traditional Garifuna style made from wood with a thatched roof (manaka), often only comprising of one or two rooms to accommodate the entire household. Cooking was a communal activity using a kitchen located in the centre of the cay, and three latrines provide shared outside toilet facilities for all community members.

4.2.1. Traditional livelihood strategies of the Garifuna

Migration has long been a part of Garífuna society, beginning with seasonal migration to follow employment opportunities within Central America in the 1800s and early 1900s, and expanding to include migration to the United States of America since the 1950s (England 2006). Many households have historically supplemented their income through employment diversity in buying and selling locally made produce, construction of roads, railways and housing, service industries, or as transnational casual workers on fishing trawler or fruit plantations. More recently, transnational economic and social ties extend broadly and deeply to connect many US cities to coastal communities (England 2006), and households within the area of influence of the CCMPA have become increasingly reliant on remittances (monies from other family members, mainly overseas).

After settling along the north coast of Honduras Garifuna communities traditionally relied upon marine and terrestrial resources of the CCMPA as part of a livelihood strategy to incorporate seasonal variation, and reduce exposure to external economic and natural events. These communities extracted both red and white finfish[3] and spiny Caribbean lobster (*Panulirus argus*)

[2] Population approximation is taken from community mapping and interviews with community leaders (2007, 2009). No Census data was available for Chachahuate. Fishing season (May-November).

[3] Red fish include snappers (*Lutjanus*) and groupers (*Serranidae*); white fish grunts (*Haemulidae*).

resources during peak fishing times (Finfish: January-June; lobster: June-December) for small-scale market sales, and white finfish throughout the whole year for subsistence level consumption. The fishery was low investment using non-motorised canoes to fish grounds in close proximity to each community and sister fishing cay. Wood and thatch (manaka) were collected from the two main islands for use in housing construction, and fruit has been used for both subsistence and trade. Other economic activities included both arable and dairy farming (where coastal land is available), construction of housing and buying and selling locally produced food products. All of these activities were undertaken during the months of the year when the conditions for fin-fishing were less productive (July-December). Livelihood strategies were designed to operate within a short-term local economy to promote resilience and reduce the risk associated with seasonal activities. This short-term economy has been perpetuated by limited education beyond elementary school for the majority of middle and older generations (parents and grandparents) which made access into salaried employment difficult. More importantly, this economy was driven by a dominant cultural preference for independent working which enabled individuals to pursue multiple livelihoods. The three case studies of this thesis all shared these commonalities, but had distinct livelihood strategies that reflect their different locations and resource availability.

4.2.1.1. Rio Esteban

Rio Esteban was the community furthest away from the CCMPA and had a stronger mix of ethnic groups (Garifuna 63%, Ladino/Mestizo[4] 37%). Fishing and farming customarily contributed equally to the income of households in this community, supported by a network of women selling fish and locally grown produce (fruit, cassabe, dairy) at locals markets. Farming had a strong tradition in Rio Esteban because the community owned expansive areas of land which enabled households to grow produce for trade and subsistence. Fishing had always been another important source of income in this community. Based on recollection data from fisher interviews in 2009, fishing generated an estimated income of US $291.57 per fishing household

[4] Mestizo means to be of 'mixed-race' origin.

per month[5] before the Cayos Cochinos was designated as a protected area, the highest of all three communities, and the community were dependent on fishing grounds that have since been protected by the establishment of the CCMPA (62.5% of catch derived from inside CCMPA). The majority of fishers in 2006 belonged to one of three fishing groups that co-existed in the community (n=47)[6]. Yet in 2007, 47% of households (n=23) stated that one or more household members were engaged in part-time fishing activities to supplement the household income, indicating there were a significant number of non-registered fishers in the community (approximately 400). However, these part-time fishers were more likely to concentrate their efforts close to the shore because they did not have access to a canoe or motorised boat.

Household income/earnings were traditionally divided almost equally between males and females (males 47%: females 53%) in Rio Esteban. Fishing and farming were generally considered male occupations, whilst farming and selling agricultural and fish produce were predominantly female activities. Households also engaged in non-traditional activities including skilled trades (hairdressing, mechanics, local businesses, crafts) and a growing dependency on remittances. The mixed nature of the community, with less dependency on traditional Garifuna activities, meant that Rio Esteban had the greatest livelihood diversity of all three communities.

4.2.1.2. Nueva Armenia

Nueva Armenia is positioned on the coast in front of the CCMPA, and also historically used Chachahuate as a temporary dwelling during fishing trips. However, since Chachahuate became a separate permanent community in its own right, Nueva Armenians have expanded their livelihood strategies to exploit its favourable geographical position. Many households in Nueva Armenia were buying and selling fish and fish related produce in La Ceiba and in the Bay Islands, making sales an important component of household income, and Nueva Armenia was the main marketplace and location of the middlemen (buyers and sellers) used by CCMPA fishers. Before the designation of the CCMPA, fishing generated a mean income of US $286 per

[5] Based on 60 fishing households, average CPUE, average species and market valuation from recollection of pre-CCMPA prices and verification with DIGEPESCA records (see Chapter 3).

[6] Estimated number of fishers for all three study sites has been triangulated from key informant interviews with HCRF, DIGEPESCA and community fishers. Official license registrations were not made available to the researcher.

household per month, with 60% of the catch being derived from inside what became the CCMPA. There were approximately 100 registered fishers in Nueva Armenia in 2006, the vast majority of whom worked individually using canoes (n=72). There was one legally recognised fishing cooperative in the community called 'Santa Ana' which had 18 members, all of whom were previously divers. This group were provided with motorised boats (lanchas) through the MODAPESCA project, shifting their efforts to finfish following the prohibitions for SCUBA diving (described in Chapter 3 section 3.3.5.2). Despite being used as a model for other fishing groups, Santa Ana had many internal frictions between members and became operationally defunct, although members still consider themselves to be part of the group. There remained a small group of individual divers who were allocated a designated lobster area adjacent to the community by the HCRF. Similarly to Rio Esteban, sales of fish produce were predominantly performed by women, males and females have contributed equally to household income (males 48%: females 52%). Although Nueva Armenia occupies a coastal location, the community owned very little tenable agricultural land therefore farming activities have only played a small part of traditional livelihood strategy.

4.2.1.3. Chachahuate

Chachahuate, the cayan community inside the CCMPA, was predominantly a fishing community because of its historical use as an overnight dwelling, and therefore the historical value of fishing for this community was significantly greater than the two coastal communities. Before the designation of the CCMPA, the mean income derived from fishing was US $619.74 per household per month, and yet interestingly, only 47% of the catch was from fishing grounds inside what became the CCMPA. Therefore, despite the highest income derived from fishing, Chachahuate was the least dependent community on resources inside the protected area. In 2006 there were approximately 50 licensed finfish fishers in this community (accounting for almost all male residents) working in familial groups or individually. Several individuals had second residences in Nueva Armenia and also received some support from MODAPESCA to change from scuba diving to hand-line fishing through their associations with Santa Ana. Only a small number of divers (n=6) remained in Chachahuate and had an on-going conflict with the HCRF because of the severity of the imposed regulations to their income. Garifuna was the main ethnic

group (85%) having derived from Nueva Armenian fishers, which allowed traditional livelihood occupations to dominate livelihood structures. However, after the cay was recognised as a permanent dwelling, livelihood strategies diversified to accommodate an expanding population, and tourism played an important livelihood role alongside fishing. Tourism was mainly an activity for women, while fishing was always an occupation for men. This blend of fishing and tourism gave the community a livelihood strategy where earnings from adult males and females were evenly integrated into the household income (males 54%: females 46%).

4.3. Socio-economic strategies of the first co-management plan (2004-2008) and the second adaptive co-management plan (2008-2012)

The first management plan had the principal objectives to conserve marine and terrestrial resources, promote sustainable fishing practices and to develop alternative livelihood options. The aim of the management plan was to reduce the overall fishing effort inside the CCMPA by providing alternative options that would allow fishers to exit the artisanal fishery (HCRF, 07:2). To achieve this, alternative livelihood options would need to provide the same working conditions and equivalent economic value that was derived from fishing. Yet, specific strategic direction for socio-economic development was lacking, referenced only by vague objectives implying that the HCRF would assist to find funding for sustainable tourism-based alternatives for displaced fishers (Figure 4.1), specifically in Nueva Armenia and Chachahuate (CCMPA management plan 2004-2008: 16). However, as stated above, historical catch data derived from fisher recollection indicated that Rio Esteban had the greatest dependency on resources inside the CCMPA, yet the community was not considered in the first management plan. Additionally, local user groups were not fully involved in the decision-making process when the regulations that had a direct impact on their livelihoods were created. This lack of participation by the local user groups to represent their economic and cultural interests has been blamed by fishers for the resultant loss of income, and strong negative responses were solicited from the communities and Garifuna representation groups.

The socio-economic conditions of the second management plan were much more aware than the first plan of the localised needs of the local communities, and provided specific socio-economic direction to opportunities for local communities through developments that complemented local

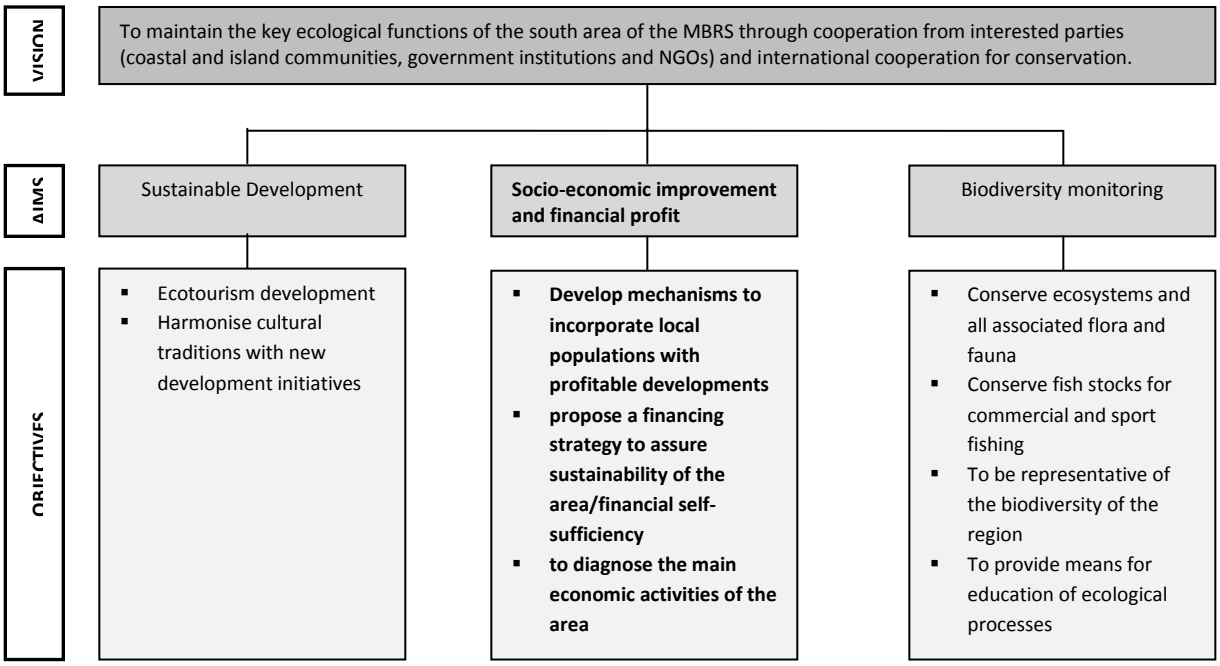

Figure 4.1: Strategic framework highlighting the socio-economic goals of the CCMPA 2004-2008

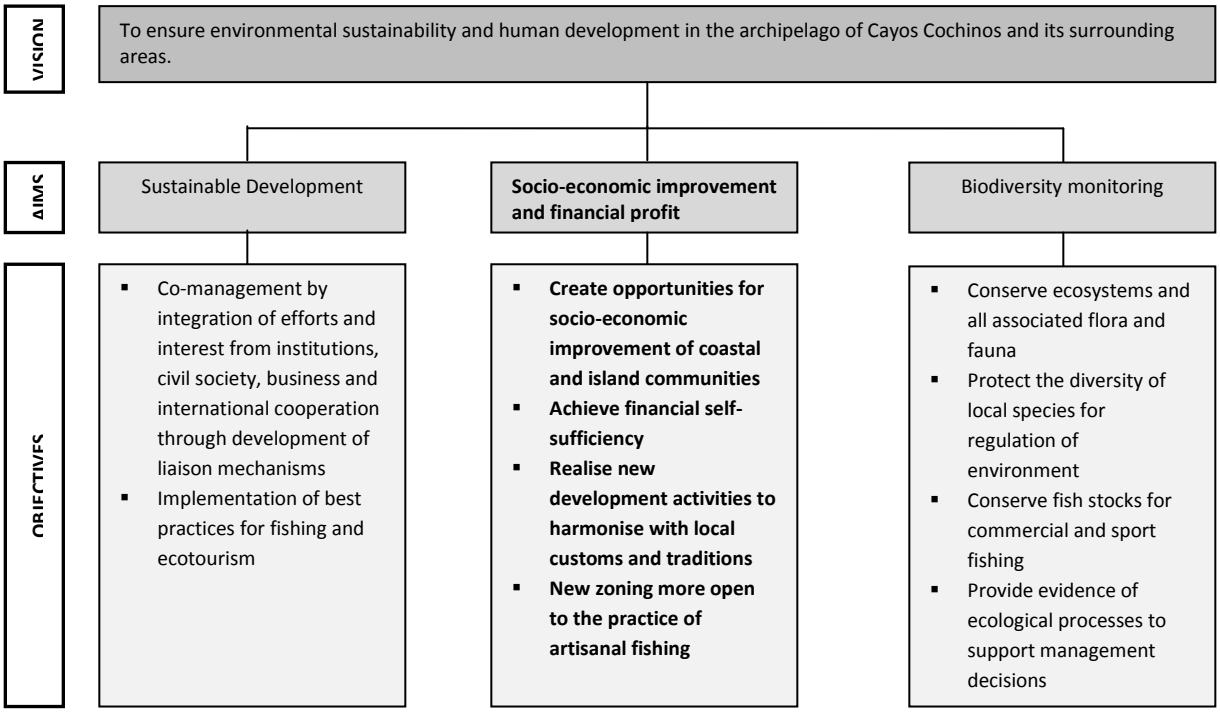

Figure 4.2: Strategic framework highlighting the socio-economic goals of the CCMPA 2008-2013

culture and traditions. In response to local stakeholder protests against the filming of the reality show in the CCMPA, more fishing grounds were opened for small-scale extraction and were included in the socio-economic strategy for local livelihood sustainability (Figure 4.2). Yet, during the revision process, a detailed analysis of the socio-economic impacts of the first management plan across households in each community, and between communities, was not available. These changes were driven by the socio-political actions of local stakeholders specific to the reality show, but also alleviated some of the income loss caused by the restrictions of the first management plan.

4.4. Socio-economic analyses

In light of the conflicts detailed above caused by the socio-economic strategic direction of the first management plan, and subsequent changes in the second management plan, the impacts for both community-level household income and fishers (as a targeted sub-group of the community) will now be examined. Impact will be measured in terms of livelihood strategies across communities, household income across communities, fisher income across communities, and fisher income within communities (See Chapter 2, section 2.7 for methods). These outcomes will then be reviewed in the context of community and fisher participation with management.

4.4.1. Community household livelihood structure

The livelihood structure of households across the whole community (not just fishers) was examined to identify the community-wide dependency on natural resources from the CCMPA. Different levels of resource use were found within four different household types (see Chapter 2 section 2.7.5), which revealed that the majority of households in all three communities incorporated fishing-derived income into their livelihoods strategies. By identifying resource dependency for the whole community, and socio-economic changes that have been attributed to fishing restrictions by respondents, it has been possible to correlate household income with knowledge of, interest in and participation with management processes. This information provides an important contribution to understanding the relationship between socio-economic change and participation in a co-management arrangement for local-level stakeholders.

In summary, the livelihood structures of all the case study communities have shown definitive change between 2006 and 2009 (Table 4.1). In 2006, half of the households surveyed (n=34) in Rio Esteban (coastal community) employed generalist livelihood strategies, which increased to 75% of households in 2007 (n=50) and 79% of households in 2009 (n=34). This increase in generalist strategies was proportional to the decrease in fishing-derived livelihoods. A similar trend was found in Nueva Armenia (also a coastal community). Here 56% of households surveyed in 2006 (n=36) generated the majority of their income from generalist livelihood strategies, which increased to 64% in 2007 (n=50) and 76% in 2009 (n=37). However, while the number of households employing generalist strategies increased, fishing-derived livelihoods only decreased in generalist-fisher and fisher-generalist households, while the number of fisher-specialist households actually increased from 14% in 2006 and 2007 to 16% in 2009. A different pattern of household livelihoods was found in Chachahuate (island community). In this community, there was only a small increase in the number of generalist households, increasing

Table 4.1: Livelihood structure of households in Rio Esteban, Nueva Armenia and Chachahuate in 2006, 2007 and 2009. Sample size = household survey respondents.

Year	Sample size	Community	% Generalist	% Generalist-fisher	%Fisher-generalist	%Fisher-specialist
2006	34	Rio Esteban	50	15	23	12
2007	50		75	10	7	8
2009	34		79	15	0	6
2006	36	Nueva Armenia	56	17	14	14
2007	50		64	10	12	14
2009	37		76	3	5	16
2006	13	Chachahuate	23	31	23	23
2007	20		10	25	55	10
2009	11		33	0	50	17

from 23% in 2006 (n=13) to 33% in 2009 (n=11). Yet livelihoods here demonstrated the most significant changes in fishing-derived livelihoods. The number of generalist-fisher households decreased from 31% in 2006 to none in 2009, yet conversely the number of households employing a fisher-generalist livelihood doubled from 23% in 2006 to 50% in 2009.

4.4.1.1. Rio Esteban

Livelihood structures in Rio Esteban have always been dominated by traditional generalist activities: farming, buying and selling fish produce, informal buying and selling within the community and cooking (Household survey: 2006; 2007; 2009). In 2006, 50% of households followed this generalist strategy, with another 15% of households adopting a generalist-fisher structure. However, a significant proportion of households had either a fisher-generalist or fisher-specialist livelihood structure (35%), indicating a stronger dependency on fishing and fish related activities for income than Nueva Armenia (28%). In spite of this strong marine resource dependency, livelihoods incorporating fishing significantly reduced between 2006 and 2009. Given this evidence for a decline in fishing activity, it is important to ask whether the 2004-2008 management plan caused this shift away from fishing-based livelihoods in Rio Esteban?

Rio Esteban was not considered to be as dependent on fishing activities as Nueva Armenia, and consequently received limited assistance from the HCRF to develop alternative livelihood options to alleviate the loss of income from fishing when the first management plan was implemented (HCRF, KI interview 14/08/06). Although no data is available to indicate household structure before the first management plan was implemented in 2004, as stated above there were more households engaged in fishing based livelihood structures in Rio Esteban (35%) in 2006 than in Nueva Armenia (28%). These households were principally divers using SCUBA equipment, and heavily dependent on specific habitat areas (mud and sand) within the CCMPA that were favourable for lobster.

The introduction of the restrictions for using SCUBA equipment and closed seasons to promote lobster stock recovery in the first management plan immediately removed the main source of income for dependent households, without any commitment given to direct financial, technical or administrative assistance to establish alternative projects. Those divers who owned motor boats were able to reach fishing grounds outside of the CCMPA, and also switch gear to hook and line in order to target finfish inside the CCMPA. However, those fishers with canoes were restricted to shallow grounds within paddling distance of the community, limiting the income they could derive from fishing in less productive grounds.

Despite a failed beach cabins project from 2005 funded by Humane International[7], the community received no external funding to promote any alternative business options until 2007, when Rio Esteban became the gateway to the CCMPA for Opwall, moving location from Nueva Armenia[8]. As a result, the community provided overnight accommodation and meals for up to 50 people per week over a ten week period between June-September 2007. Furthermore, in 2008 a restaurant was constructed on the beach front funded by WWF, GAD and the TNC to provide a central location for all visitors to eat. During the weeks when Opwall were present in the community, the cooking group used this facility on a rotational system to prepare meals for staff/students, distributing the profits equitably around the group which included 21 households in 2008 and 2009. Meals provided US $5 profit per plate which created a mean income value of US $3000 over the ten week period, giving each cooking household US $142.86.

Regardless of these developments, considerable economic pressures remained on the use of traditional activities because few alternative income opportunities existed in the community. To help relieve these pressures, many households became increasingly reliant on remittances as their main or secondary source of income. In 2009, 34% of respondents received remittances, worth an average US $50/month, from family members living either elsewhere in Honduras or abroad. Approximately 71% of respondents believed that up to 60% of the population had moved out of the community, the majority of which (48%) were believed to be the community youth (aged 18-30). The majority of those moving out of Rio Esteban relocated to urban areas within Honduras (38%) and the USA (27%) for work opportunities. As a result of this migration and associated remittances, generalist households earned a mean income of US $550.43/month, over US $200 more than any other household in the community, and more than the national remittance average of US $369 (UNDP, 2009). Since this thesis accepts that remittances generated outside the immediate household are contributing to its overall income, generalist households also had the highest mean number of earners (2.2) and diversity of income generating activities (2.2) than any other livelihood type. However, these same households also had the highest mean number of

[7] An international NGO specialising in community-based sustainable development projects.

[8] Lack of community cooperation and responsibility impacted the ability of the community to manage these projects, resulting in disengagement within the fishing cooperative and with the HCRF.

dependents (4.8). As a result of this out-migration, the number of households in the community with only one earning adult male and one adult female increased from 53% in 2006 to 62% in 2009, and the number of households with three or more child dependents rose from 47% in 2006 to 66% in 2009.

The decline of fishing-inclusive livelihood strategies in Rio Esteban was correlated to an increase in households diversifying their options to include non-traditional activities. Every year generalist households were asked if their fishing had been part of their livelihood structures before the introduction of the conservation-based restrictions in the CCMPA. In 2006, 54% of these households stated that fishing had been a livelihood activity before the management restrictions, but only 24% of those respondents cited the management restrictions as the cause for this decline. Similarly, in 2007, 46% of generalist household respondents stated that fishing had been a supplementary income before the management restrictions, and only 18% of these respondents indicated these restrictions had stopped their household from fishing. This trend continued in 2009, with 42% of households stating that fishing was part of their livelihood structures before the introduction of the management plan, and only 12% of these respondents attributing its decline to the fishing restrictions.

This implies that the increase in the number of households employing generalist livelihood strategies coincided with the introduction of the first management plan, but the introduction of fishing restrictions was not the main driver for this change. Instead, remittances and out-migration, illustrative of a social change in the community, were the main drivers for generalist households because remittances generated substantially higher household incomes than supplementary/part-time fishing activities. So for generalist households, fishing was no longer necessary to supplement household income.

4.4.1.2. Nueva Armenia

The household livelihood structures in Nueva Armenia showed similar trends to those in Rio Esteban. Generalist livelihood strategies gained greater importance while fishing strategies became more marginalised between 2006 and 2009. The fishing restrictions imposed by the first management plan severely impacted lobster divers who collectively generated the majority of their catch (mean 78%) from areas inside the CCMPA. Similarly, Nueva Armenian fin-fishers

derived most of their catch (63%) from fishing grounds inside the protected area. To alleviate this loss of revenue, the HCRF specifically targeted the divers in this community for alternative income options to reduce dependency on the CCMPA. Administrative support was provided by the HCRF to help divers establish the fishing cooperative – 'Santa Ana', and the MODEPESCA project provided motorised vessels and fin-fishing equipment. This financial and technical stimulus enabled fisher-specialists to continue to earn their household income through fishing activities, generating a mean income worth US $34/month more than any other household type in the community by 2009, becoming known as '*los millionaires'* (Nueva Armenia individual fishers' focus group, 18/06/07). Further assistance to cooperative fishers included an ice-packing facility to increase capacity to buy and sell fish products; the hotel in Chachahuate specifically approved to provide income support for cooperative fishers; and a designated community lobster free-diving area to the south of the CCMPA which restricted access to all other communities. Yet in contrast, generalist-fishers and fisher-generalist households (all individual fishers) in the same community generated the least income of all household types.

The individual fishers that took part in the focus group in this community perceived that such alternative development assistance was heavily focused on these '*los millionaires'* (18/06/07), and denied other mixed fishing/generalist households the same opportunities to cooperate in alternative projects. In response to this, many of these individual fisher households adopted generalist livelihood strategies to find non-traditional employment opportunities. By 2009, 39% of household respondents stated that their primary source of income was remittances, although most of these households (74%) receive less than US$50/month. Again 64% of respondents believed that up to 60% of the population were leaving the community to work elsewhere, 46% of these living within Honduras and 26% living in the USA looking for employment. This pattern showed a similar trend as Rio Esteban, with 50% of those leaving the community aged between 18 and 30, leaving 61% of households with only one adult male or female to generate income within the community, and 68% of households with three or more child dependents. By 2009, the value of remittances had become the primary or secondary source of income to 76% of generalist households in Nueva Armenia, replacing fishing as one of the main livelihood options.

While remittances have become steadily more important for household income since 2006, in 2007 the majority of income for households in Nueva Armenia was derived from temporary manual construction work, with 64% of generalist households employed in construction of hotels, luxury housing developments and access roads near to La Ceiba. However, by 2009 only two respondents stated that construction was a source of income. Whilst this illustrates the transient and temporary nature of non-traditional employment options in the coastal communities, it also demonstrates an aptitude and willingness for diversity and flexibility of livelihoods.

Despite the difficulties experienced by individual fishers in Nueva Armenia (n=8, 2009), generalist households showed similar trends to those in Rio Esteban when asked if fishing had been a livelihood activity prior to the introduction of the first management plan. In 2006, 62% of generalist respondents stated that someone in the household used to fish, and 52% of those believed that the fishing restrictions had been the main reason why this was no longer an option. Yet in 2007 and 2009, the number of generalist households that used to fish remained quite even (2007: 58%; 2009: 52%), and fewer respondents attributed this loss of income to the management restrictions (2007: 33%; 2009: 40%). The main reason for the loss of fishing to the livelihood structure was remittances and other more profitable income generating activities (construction, salaried employment, hotels). Therefore, while fishing remained an important subsistence activity for these households, restrictions for fishing within the CCMPA were not the main drivers for change to generalist livelihood patterns.

4.4.1.3. Chachahuate

In 2006, only marginally more households (31%) in Chachahuate derived income from generalist-fisher strategies indicating a slightly greater importance of tourism than fishing for income. By 2007, there was a sharp increase in fisher-generalists (55%) which correlated with a decrease in fisher-specialists and generalists (both 10%), which remained similar in 2009. This increase in fisher-generalist households in 2007 coincided with the construction of a hotel in the community owned and managed by the fishing group ‘Santa Ana’. Although this fishing group

was established by fishers in Nueva Armenia[9], close familial links existed with households in Chachahuate which enabled fishers there to capitalise on the associated tourism opportunities from the hotel. However, Chachahuate did receive 5% of all revenue from the hotel as a form of rental payment which contributed towards the costs of schooling for the youth living in Chachahuate.

The hotel was funded by WWF, GAD and the TNC as one of twelve alternative income projects for Nueva Armenia identified to alleviate the financial hardship created by the CCMPA. Hotel income data was only available for January-June of 2009 courtesy of GAD (GAD, KI interview 01/08/09), and during this six month period the mean income generated per fisher (n = 18) was US $21.63 per month, with a mean number of visitors per month of 57.17. March and April respectively generated significantly higher income (US $33.13/m; US $27.94/m) than the other months, receiving the greatest number of visitors (83; 69). Based on these mean valuations, the number of visitors to Chachahuate in 2009 was around 700 people (not including Opwall), below the carrying capacity of the community. Although the low visitor numbers recorded in 2009 are not representative of the potential income derived by households from tourism, it illustrates the vulnerability of alternative livelihood options to external forces (in this case an earthquake and political coup) that can operate across the boundaries of the governance system..

Beyond the direct income generated by the hotel for external fishing elites, this project contributed economic benefits for the whole community because of the increased level of tourism on the cay. Since the development of the hotel, the women involved in the cooking group in Chachahuate (18 households) believed that the volume of tourists had increased because of the option to stay overnight in the hotel (CHA 09:4). Although no tourism data was collected prior to 2001, since then an average of 1750 day visitors have visited the CCMPA each year, although there has been an average increase of 2.7% per year since 2007 attributed to the exposure of the CCMPA by the filming of the reality shows (HCRF KI interview, 20/07/09). To better facilitate this level of tourism, in August 2007 a communally owned restaurant (Restaurante Bendicion de Dios/God Bless You Restaurant) was constructed with funding from

[9] This source of income is not recognised by the Santa Ana members as part of their livelihood structure, continually classifying themselves as fisher-specialists as opposed to fisher-generalists.

WWF, GAD and TNC to provide a communal eating area. This restaurant operated on a rotational system similar to Rio Esteban, distributing income equitably between the cooking group households.

To evaluate the contribution of the hotel for cooking group households, income data for January-April 2009 from the restaurant (GAD KI interview, 03/08/09) detailing the proportion of day and overnight visitors was combined with the number of meals provided by the restaurant. The mean number of meals prepared was 650.25 per month, providing a mean income of US $12.24 per household per month (US $146.88 per year). However, over these four months a trend was identified for income derived from day and overnight visitors. During March and April (high season) 53% and 76% respectively of meals in the restaurant were for overnight visitors. In January and February (low season) only 25% and 39% of meals were generated by overnight tourists. Therefore, the most substantial proportion of the restaurant's income was generated by the tourism brought to the community by the hotel during the high season, but day visitors provided the main trade during the low season. This higher level of tourism also enabled male fishers to generate more income by supplying the fish and shellfish products for consumption in the restaurant.

In 2009, all households surveyed were either generalists (33%) or fisher-generalist where the most significant proportion of the income was derived from fishing (55%) or entirely from fishing (17%). Generalist strategies in this community were not derived from remittance-based income, but reflected the inclusion of tourism into household livelihood structures. Thus, all of the sample households derived income from a tourism-fishing livelihood strategy. This strategy reinforced both the local economy and community social capital through household level inter-dependency to provide tourism services through hospitality, cooking and food supplies.

On the basis of the household livelihood analysis, the general trend of household livelihood strategies in the two coastal communities showed that fishing-based livelihoods decreased between 2006 and 2009, to be replaced with generalist strategies that relied more heavily on remittances and non-traditional occupations. These livelihood changes reflected a general social shift away from traditional activities rather than as a result of the management restrictions imposed on fishing-based activities in the CCMPA, and yet fisher participation in the

management process was relatively high. Conversely, in Chachahuate fishing-based livelihoods remained consistently important in spite of the impact of restrictions for diving, reflecting the lack of alternative options available inside the CCMPA, with no land or urban centres. Households in this community were impacted more severely than in the coastal communities, yet fisher participation with the management process here was low. Therefore, the livelihood patterns generated three emergent questions for management and participation in the CCMPA:

1. What factors were driving participation in management in the coastal communities?
2. What factors were driving non-participation in management in the cayan community?
3. Does socio-economic status have an impact on compliance with management regulations?

To address these questions, community-level household income, fishers income as a sub-group in each community, and socio-cultural factors were all assessed in 2007 and 2009 to identify similarities and differences between the income derived from the CCMPA in all three communities, and factors driving participation in the management process.

4.4.2. Community-level household income

An assessment of the level of income derived from the different livelihood strategies examined above enabled a monetary value to be ascertained for resource dependency. By identifying the expenditures of households in each livelihood category, the relative importance of different income activities was assessed between 2007 and 2009 to understand the socio-economic impact of management regulations at the community-level, and between different communities. The relationship between participation in the management process and socio-economic status in each community was then examined to identify weaknesses in the management process.

In summary, the households surveyed in all three communities earned more than the average income per capita for Honduras in both 2007 and 2009. In 2007, the average income for a Honduran household was US $4.49 per day (US Department of State, 2009, www.state.gov). The mean income for the Garifuna households sampled in the three study sites was higher than this national average: Rio Esteban - US $5.66/day; Nueva Armenia - US $6.38/day; and Chachahuate

- US $7.57/day. By 2009, the national average income had increased by 0.7% to US $4.52 per day (US Department of State, 2009, www.state.gov), but the average income of the households sampled in all three communities had increased to more than double the national average: Rio Esteban - US $11.47/day; Nueva Armenian - US $10.60/day; and Chachahuate - US $10.01/day. Therefore, mean household income increased substantially between 2007 and 2009 for all three communities (Table 4.2), but to what extent can this relative income increase be attributed the management conditions for the CCMPA and associated socio-economic policies?

Table 4.2: Average income per community in 2007 and 2009 based on representative random sample from household survey respondents.

	Mean income/month (lempiras)	**Mean income/month (US dollars)**
2007		
Rio Esteban (n=48)	3185.56	175.25
Nueva Armenia (n=50)	3589.36	200.65
Chachahuate (n=20)	4261.05	223.35
	Mean income/month (lempiras)	**Mean income/month (US dollars)**
2009		
Rio Esteban (n=34)	6457.06	349.03
Nueva Armenia (n=36)	5965.70	322.47
Chachahuate (n=12)	5158.73	278.85
	% increase mean income/month 2007-2009	
Rio Esteban		**99**
Nueva Armenia		**61**
Chachahuate		**25**

4.4.2.1. Rio Esteban

Rio Esteban had the lowest mean household income of all three communities in 2007 (US $175.25/month). Households had a high mean number of occupants (5.63), but only 1.4 earners employing an average of 1.56 different livelihood options to generate income, principally relying on agriculture (36%), fishing (17%) and remittances (22%). Respondent households were 75% generalists, dependent on non-fishing traditional activities for the majority of household income. However, by 2009 Rio Esteban had the greatest mean wealth, with an average household income of US $349.03 per month, an increase of 99% (US $173.8).

Analysis of the household demographics between 2007 and 2009 revealed that the mean number of earners and different livelihood options undertaken by households was almost constant, but the mean number of occupants per household decreased to 3.97, reducing the number of dependents by 1.66. These similarities indicated that the main cause of this wealth increase was the relative income derived from each income generating activity. The greatest change in relative income was found to be in households using a generalist-fishing strategy, which increased from US $184.86 per month in 2007, to US $451.66 per month in 2009 (an increase of 144%). Although only 21% of households in 2009 undertook fishing or a fishing-related activity as part of their livelihood structure, it was these households that significantly increased the overall income of the community. Importantly, these generalist-fishers included members of the fishing groups who owned the motorised boats capable of travelling to more productive distant fishing grounds. Therefore, these households targeted species that had the highest market value, and also used their boats to transport tourists to the CCMPA. However, incorporating non-fishing based activities into livelihood strategies transitioned these households from fisher-specialists to generalist-fishers, which has skewed the analysis of income because the relative value of tourism was greater than fishing in spite of greater effort and revenue from fishing. Yet importantly for participation in management, the cooperative fishers benefitting from this increased level of income were also the selected community representatives in the management process. Thus, higher socio-economic wealth derived from fishing was an associated factor in participation with management for the CCMPA.

4.4.1.2. Nueva Armenia

Nueva Armenia was the wealthiest coastal community in 2007 based on household income, benefitting from the hotel in Chachahuate and as the main location for buying and selling fish products from the CCMPA. The mean household income was US $200.65 per month with 64% of households generating the majority of their income from generalist activities, primarily tourism (15%), agriculture (17%), construction (17%) and remittances (39%). The mean number of occupants per household was 5.92 (S.E, 0.2), the highest of all three communities in 2007, but also had a low mean number of earners (1.42) and the lowest mean number of different occupations per household of all three communities (1.44). Therefore, individual households in

Nueva Armenia relied on fewer income generating activities, but these activities generated more income than multiple activities in Rio Esteban.

In 2009, the mean community household income was US $322.47, an increase of 61% from 2007 (US $121.82). While only marginal changes occurred in the household demographics between 2007 and 2009 (mean number of occupants decreased from 5.92 to 5.61; mean number of earners increased from 1.42 to 1.55) the mean income increased by 45% between 2007 and 2009, worth an average of US $305.88 per household per month by 2009. The income generated by the informal sector increased by 6% between 2007 and 2009, including pulperias (general stores) (22%), selling cassabe bread (16%) and clothing repairs (2%), which correlated with the decrease of Opwall home-stay tourism since 2007. Tourism-based activities were considered a subsidiary livelihood option in Nueva Armenian households despite being widely recognised as having increased the quality of life for the whole community. Therefore, the relocation of Opwall tourism to Rio Esteban had only a minimal economic impact on household income, mitigated by the favourable geographic location of the community which allows it to exploit other tourism opportunities.

However, whilst in 2007 fishing households earned (marginally) more than non-fishing households; by 2009 this situation was reversed despite the increased value of fishing demonstrated in both Chachahuate and Rio Esteban. Only fisher-specialists in Nueva Armenia earned an amount greater than the community average (US $356.70/annum). These specialists were members of the fishing cooperative ‘Santa Ana’. Although these fishers classified themselves as fisher-specialists, they also generated income from tourism transportation to the CCMPA. In terms of participation with the management process for the CCMPA, these fishers were the community representatives. Similarly to Rio Esteban, their participation in the management process correlated with the highest socio-economic wealth derived from resources of the CCMPA, primarily income from tourism made available to these cooperative members via a relationship with the HCRF. Conversely, individual fishers perceived that their income had decreased since the introduction of the fishing regulations and had not been invited to attend any management meetings (Nueva Armenia individual fishers focus group 18/06/07). These fishers had the lowest socio-economic wealth derived from resources of the CCMPA, but showed a

strong preference to be involved in the management process. Therefore, socio-economic status did not determine willingness to participate in management, but a higher socio-economic status demonstrated greater connectivity with the management process based on networks, which is discussed in detail in Chapter 5, section 5.2.6.

4.4.2.3. Chachahuate

In 2007, Chachahuate had the greater mean household wealth of all the communities, with a mean household income of US $223.35 per month. However, this community had the lowest mean number of occupants per household (5.4), and the highest mean number of earners per household (2.3) involved in two or more livelihoods. Yet by 2009, Chachahuate had the lowest mean household income, only US $278.85 per month. Even though growth in mean income was lower than the two coastal communities, there was an increase in household income of 25% within this two year period (US $55.5). However, the mean number of occupants per household had almost doubled since 2007 to 10.7, and the mean number of earners per household had slightly fallen from 2.3 to 2. Economic growth was limited by geographical factors, coupled with in-migration of family members coming from Nueva Armenia to exploit the community's fishing and tourism success. Although these supplementary household members were learning the skills associated with each livelihood, their economic contribution was minimal. The restrictions on visitor numbers to the CCMPA created a limit on the income available from tourism for the whole community, therefore the greater the number of people involved in tourism the lower the income available per individual/household. So, although the mean household income generated a similar amount from tourism activities across the community, the value per person from each household was lowered as a result of the population influx.

The physical limitations of space on the cay also limited the tourism capacity, restricted under both management plans to a sustainable number per month (average 200) to control the pressure on both facilities and environmental damage. So the increase in mean household income between 2007 and 2009 was derived from fishing (an increase of 26%, US $59.71), but was evenly distributed between fisher-generalist households. Therefore, socio-economic wealth derived from fishing in this community was similar for all households, and generated a sustained income in spite of the restrictions imposed on extractive activities in the CCMPA. Yet, fishers in this

community have been less compliant with these regulations and have not participated in the management process (Chachahuate individual fishers' focus group, 28/07/07). Such behaviour generated a paradox for the hypothesis that greater socio-economic wealth from resources in the CCMPA correlated with greater participation in the management process. Here, no stratification of socio-economic status emerged between fishers or households as a factor for participation. Therefore it was necessary to examine the impact of the management regulations on the income generated from fishing activities.

4.4.3. Impact of management regulations on income from fishing

In any co-management arrangement that regulates extractive activities in traditional fishing locations, local-level fishers and fishing-dependent households will be the stakeholders most impacted by policies that place restrictions on income-generating activities. Thus, a co-management arrangement that recognises the specific socio-economic conditions of local user groups and makes provisions to create appropriate alternative livelihood options has a better chance of generating compliance with conservation-focused regulations. This section addresses questions concerned with the distribution of income from fishing within and between communities, income derived from alternative livelihoods, appropriateness of alternative livelihoods for these communities, to identify whether income impacted the participation of user groups in the management process.

Across all three communities, households using livelihood strategies that included fishing activities generated a mean income higher than generalist households. Table 4.3 shows the mean income of all households and fishing households between 2007 and 2009. In Rio Esteban, household income derived from fishing increased by 144% between 2007 and 2009. Table 4.4 shows income distribution by fisher type, and identifies generalist-fisher households as the main source of this increase, dominated by fishing group members who also engage in tourism-related activities. In Nueva Armenia, while households employing fishing-based livelihoods generated a higher mean income than income distributed across all households in 2007, fishing households generated a lower mean income in 2009 (Table 4.3). By examining fishing livelihood types (Table 4.4), generalist-fishers in Nueva Armenia have consistently generated the lowest mean income, creating an opposite trend to Rio Esteban. Instead, fisher-generalists and fisher-

specialists were the highest earners. These households represented members of the cooperative fishing group who benefitted from motorised boats giving them access to more productive fishing grounds, as well as income from tourism-based activities.

In Chachahuate, relations between fisher-specialists and the HCRF were poor in 2007 because regulations imposed to restrict extraction of shellfish prevented divers from generating an income from diving during the closed season:

> *'the Foundation came along and cut off my income because they prohibited diving. The Foundation hurt divers, they don't hurt fishers, only divers. The co-management plan they have is a good idea, but they need to better it and not cut people off from their livelihood'* (Chachahuate fisher interview, 07/07/07).

These fisher-specialist diving households reported frequent encounters with the Navy patrol guards because divers were openly disregarding the regulations (Chachahuate individual fishers' focus group, 08/07/07). Individual divers lost equipment and catch, meaning that these households were expending more money to retrieve gear and pay fines than was being generated by fishing-based activities. Therefore in these households, tourism became the main source of income in 2007, re-classifying their livelihood strategies as generalist-fishers. So, generalist-fisher households earned the highest mean income (Table 4.3). However, in 2009 fisher-generalists strategies dominated the socio-economic trend (Table 4.4), indicating that income from fishing was contributing more to the household than tourism-based activities. This reflected the changes to the fishing regulations (detailed in Chapter 3 section 3.4) that opened more fishing grounds for lobster diving within the CCMPA.

4.4.4. Value of fishing – fishing cooperatives versus individual fishers

An indication of the value of fishing was calculated using fishers' perception-based information of landings, species and market values combined with actual landings data collected by the HCRF in 2007. Values were calculated based on the mean perception of fishing effort in both Nueva Armenia and Chachahuate (three fishing trips per week for six months). The landings data was split by boat type (canoe or motorised vessels) to identify differences between income derived from the CCMPA for individual and cooperative fishers, and mean community income

Table 4.3: Mean average income across all households and all fisher livelihoods households, showing the increase of income between 2007 and 2009.

		Mean income across all households					
Year	Community	Sample size	No. household	No. earners	No. diff. jobs	Income(US$/month)	% increase income(US$/month)
2007	**Rio Esteban**	48	5.63	1.4	1.56	175.23	
2009		34	3.97	1.35	1.44	349.03	
	Difference		1.66	0.05	0.12	173.8	99
2007	**Nueva Armenia**	50	5.92	1.42	1.44	200.65	
2009		36	5.61	1.55	1.58	322.47	
	Difference		0.31	0.13	0.14	121.82	61
2007	**Chachahuate**	20	5.4	2.3	2	223.35	
2009		12	10.77	2	2	278.85	
	Difference		5.37	0.3	0	55.5	25
		Mean income across all fisher households					
Year	Community	Sample size	No. household	No. earners	No. diff. jobs	Income(US$/month)	% increase income(US$/month)
2007	**Rio Esteban**	12	6.59	1.58	2.08	184.86	
2009		7	4.29	1.86	1.86	451.66	
	Difference		2.3	0.28	0.22	266.8	144
2007	**Nueva Armenia**	18	6.22	2.06	2.22	211.11	
2009		9	6.33	1.89	1.78	305.88	
	Difference		0.11	0.17	0.44	94.77	45
2007	**Chachahuate**	18	5.17	2.5	2.1	232.1	
2009		8	5.38	2.13	2.13	291.81	
	Difference		0.21	0.37	0.03	59.71	26

Table 4.4: Mean average household income (livelihoods) and mean household demographics in 2007 and 2009 for all three communities.

Community/ household fisher type →	Sample size			**Mean number in household**			**Mean number of earners**			**Mean number of different income activities**			**Mean income(US$/month)**		
↓	Year 2006	2007	2009	2006	2007	2009	2006	2007	2009	2006	2007	2009	2006	2007	2009
Rio Esteban															
Generalist-fisher	5	5	5	7.4	6.4	4.8	1.6	1.4	2.2	2.6	2.4	2.2		214.05	550.43
Fisher-generalist	8	3		6.25	7.3		1.25	1.6		2.4	2.7			183.78	
Fisher-specialist	4	4	2	5.75	6.3	3	1.25	1.8	1	1	1.3	1		148.65	204.73
All	34	48	34	6.2	5.6	3.9	1.26	1.4	1.35	1.6	1.6	1.4		175.23	349.03
Nueva Armenia															
Generalist-fisher	6	5	1	6.5	6.8	7	1.7	1.8	2	1.8	2.4	2		142.7	192.26
Fisher-generalist	5	6	2	8.2	5.2	4.3	1.6	2.7	2.5	1.6	2.7	2		252.25	210.21
Fisher-specialist	5	7	6	7.8	6.7	6.8	1.6	1.3	1.7	1.2	1.7	1.7		224.71	356.7
All	36	50	38	6.2	5.9	5.6	1.3	1.42	1.55	1.5	1.44	1.6		200.65	322.47
Chachahuate															
Generalist-fisher	4	5		4.25	6.4		1.75	2.4		2	2.8			260.54	
Fisher-generalist	3	11	6	5.7	4.3	5.3	2	2	2.2	2.3	1	2.2		228.94	306.93
Fisher-specialist	3	2	2	3.7	7	5.5	2.3	2	2	1	1	2		178.38	246.45
All	13	20	12	4.5	5.4	10.7	1.6	2.3	2	1.5	2	2		223.35	278.85

has been adjusted to account for the number of each type of fisher[10]. No landings data was collected by the HCRF for Rio Esteban, therefore no valuation has been calculated for this community. Although the HCRF did not record details of exact fishing grounds or soak time of gear (time spent fishing/time gear left in the water) to determine the catch-per-unit-effort (CPUE) of fishing inside the CCMPA, the average finfish landings were recorded from north, central and south zones allowing a mean total effort inside the protected area to be calculated.

4.4.4.1. Nueva Armenia

From the landings data collected in 2007, only 38% of all recorded finfish landings in Nueva Armenia were taken from grounds inside the CCMPA. Fishing effort was more concentrated in areas within the north zone (15%) and south-east zone (16%) of the CCMPA. Snappers and grunts were the primary target species because of the higher market value, accounting for 46.70% of all landings within the community. Overall, the mean value of fishing was US $1592.32 per household per month, considerably less than the value of fishing in Chachahuate. Landings from inside the CCMPA generated US $589.16 per household per month, and landings from outside the CCMPA generated US$1003.16 per household per month (see Table 4.5).

Table 4.5: Mean average value of total fishing effort per fishing household and the mean value of fishing effort from inside the CCMPA for individual fishing household per day, and total monthly value to household based on HCRF data.

Community	2007 Mean value/household/day (US $)	2007 Mean value/household/month (US $)
Chachahuate	67.56	5269.82
Nueva Armenia	48.25	1592.32
	Mean % catch inside CCMPA	Mean % catch outside CCMPA
Chachahuate	62	38
Nueva Armenia	37	63
	2007 Mean value/month/inside CCMPA (US $)	2007 Mean value/month/outside CCMPA (US $)
Chachahuate	3267.29	2002.58
Nueva Armenia	589.16	1003.16

[10] Numbers of fishers were calculated using the number of fishers derived from community leader interviews in section 1, and the number of each vessel type per community.

At this time the motorised boats were not frequently being used for fishing because the fuel costs were too high (60 lempiras per gallon) to make substantial profits (Nueva Armenia cooperative fishers' focus group, 18/06/07). Instead, these boats were used for transportation to and from the CCMPA. However, when motorised boats did go fishing, a mean income value of US $61.94 per day was generated[11] (Table 4.6). After accounting for fuel costs and profit sharing between four fishers, the mean income per individual was US $12.99 per day. Unlike Chachahuate, this was almost double the mean income derived by individual fishers using canoes (US $6.74 per day) (Table 4.7). This lower individual income reflected the conditions that impact their ability to fish: greater distance to reach fishing grounds inside the CCMPA; availability of fishing grounds during adverse weather conditions; and preference for shellfish diving which was of higher value.

This income discrepancy between cooperative fishers and individual fishers, supporting the income differences between fisher-specialist and generalist-fisher livelihoods (section 4.4.1), illustrated a socio-economic stratification in Nueva Armenia created by the provision of alternative livelihoods. Here, fishers were identified by the HCRF to form a cooperative which has since been the focus of alternative developments in the community. Cooperative fishers received motorised boats and equipment from the MODAPESCA project, designed to facilitate fishing in more distant fishing grounds to reduce dependency on the CCMPA. However, instead of fishing these boats have been used for tourism-based activities by the cooperative fishers. Yet individual fishers have received no benefits support from the HCRF or access to the boats by the cooperative members. These cooperative members also acted as community representatives and in that position these fishers should have connected individual fishers with alternative income developments and the management process. Instead, cooperative members acted through rational choice to protect and enhance their own livelihoods.

Without access to alternative livelihood options, individual fishers believed that they had no other options than to break the regulations to continue to support their families:

[11] Values have been calculated per fishing boat for an average fishing trip. Motorised boat is 25ft with an engine of 20-40 hzp. Canoes are 8ft with sail and paddle.

Table 4.6: Mean average daily revenue in 2007 per motorised boat in Nueva Armenia, based on average boat catch rates provided by fishers and market values of target species.

	% of total average catch	Market value/lb (lemp)	% catch (lbs)	Value (Lempira)	Value (US Dollars)
Target species					
Snappers	58.23	18.00	42.12	758.12	39.42
Groupers	3.00	12.00	2.17	26.04	1.35
King Fish	16.23	18.00	11.74	211.30	10.99
Grunts	0.00	18.00	0.00	0.00	0.00
White Fish	22.54	12.00	16.30	195.64	10.17
Total	100.00		72.33	1191.10	61.94

Table 4.7: Mean average daily revenue in 2007 per canoe in Nueva Armenia, based on average individual catch rates provided by fishers and market values of target species.

	% of total average catch	Market value/lb (lemp)	% catch (lbs)	Value (Lempira)	Value (US Dollars)
Target species					
Snappers	58.23	18.00	4.58	82.49	4.29
Groupers	3.00	12.00	0.24	2.83	0.15
King Fish	16.23	18.00	1.28	22.99	1.20
Grunts	0.00	18.00	0.00	0.00	0.00
White Fish	22.54	12.00	1.77	21.29	1.11
Total	100.00		7.87	129.60	6.74

> '*what else can we do? I need to look after my family, and they (HCRF) don't let us. Los millionares do well, and now whenever we leave, they are on their radios telling them (Navy) where we're going so it's even worse now. The best time to fish is at night to avoid them'* (Nueva Armenia individual fishers' focus group, 26/06/07).

While income was the main reason for non-compliance, individual fishers in Nueva Armenia, like individual fishers in Chachahuate, identified targeted enforcement on their activities as the main driver for non-compliance. Therefore, cooperative members acted through rational choice to protect and enhance their own livelihoods. What this statement also illustrates is the perception that the cooperative fishers in Nueva Armenia were working with the HCRF to prevent individual fishers from fishing, exacerbating the socio-economic stratification between the two groups in terms of participation with the managing process.

This stratification based on both socio-economic status and empowerment of cooperative fishers within the management process, illustrates an important outcome from the development of alternative livelihoods. In Chachahuate, alternative ecotourism livelihood options have been more equitably distributed between all households in the community. While this was possible because of the relatively smaller size of the cayan community, perhaps significantly there was no fishing-based household stratification. Similarly in Rio Esteban, no stratification between cooperative fishers and individual fishers developed because the community was not the focus for alternative developments in the first management plan. As a result, fishers worked collectively to develop ecotourism developments funded by external organisations to benefit the whole community as opposed to a minority of fishers.

4.4.4.2. Chachahuate

From the landings data collected by the HCRF, 62% of recorded catch was taken from fishing grounds inside the CCMPA (north zone, 23%; central zone, 18%; south zone, 21%). Fishing effort was concentrated within the CCMPA using canoes, and evenly spread between the three zones. However the total weight of finfish landed from the north zone (477kg) was almost double that from each of the other zones (central, 250kg; south, 297kg). This preference for northern fishing grounds correlated with the remaining 38% of recorded landings which were taken from fishing grounds outside the CCMPA northern boundary, where larger species of

higher value (snappers, grunts) were targeted (see Chapter 3 section 3.3.5 for species composition). The mean value of landings from inside the CCMPA (62%) was US $3267.29 per household per month, and landings from outside the CCMPA (38%) valued at US $2002.53 per household per month (Table 4.5).

While both cooperative fishers and individual fishers targeted the same species based on the highest market values, motorised vessels generated approximately US $75 per day from fishing (Table 4.8). However, after rent and fuel costs were deducted (approx. US $10 per trip, Chachahuate individual fishers' focus group, 12/07/07) the remaining value shared between four fishers made an individual profit of US $16.25 per day, just less than the value of individual fisher effort using canoes at US $16.60 per day (Table 4.9). Cooperative fishers questioned the benefits of working within a group to generate higher income than working independently:

> '*Cayucos can only bring in 2-3 lbs of fish at a time, whereas the lanchas (motorised boats) can bring in 200-300 lbs. but it costs 1000 lempira in fuel to go fishing, so we're only making 200 lempira profit. It's just not worth it'* (Chachahuate, fisher interview 24/06/09).

These findings indicated that earnings generated from fishing were fairly equal for both motorised boats and canoes in Chachahuate, and no monetary benefits were created through cooperative membership. However, owners of motorised boats supplemented their income with tourism-based activities which were also impacted by management regulations that limited the number of visitors to the CCMPA per year. Tourism had formed a mainstay of livelihood strategies in the community since the 1970s (Chachahuate community leader interview, 25/06/07), but fishers believed that tourism-based income actually decreased after the introduction of the management regulations because cruise ships were prohibited from entering the protected area (Chachahuate individual fishers focus group, 08/07/07). Considering all households in Chachahuate generated the vast majority of their income from fishing and tourism activities, socio-economic dependency on the CCMPA was not a driver for participation in the management process. However, loss of income derived from shellfish was the main driver for non-compliance with the management regulations:

Table 4.8: Mean daily revenue in 2007 per motorised boat in Chachahuate, based on average boat catch rates provided by fishers and market values of target species.

	% of total average Catch	Market value/lb (lemp)	% catch (lbs)	Value (Lempira)	Value (US Dollars)
Target species					
Snappers	57.55	18.00	49.63	893.36	46.45
Groupers	8.00	12.00	6.90	82.79	4.31
King Fish	2.52	18.00	2.17	39.12	2.03
Grunts	17.90	18.00	15.44	277.87	14.45
White Fish	14.03	12.00	12.10	145.19	7.55
Total	100.00		86.24	1438.33	74.79

Table 4.9: Mean daily revenue in 2007 per canoe in Chachahuate, based on average individual catch rates provided by fishers and market values of target species.

	% of total average catch	Market value/lb (lemp)	% catch (lbs)	Value (Lempira)	Value (US Dollars)
Target species					
Snappers	57.55	18.00	11.02	198.27	10.31
Groupers	8.00	12.00	1.53	18.37	0.96
King Fish	2.52	18.00	0.48	8.68	0.45
Grunts	17.90	18.00	3.43	61.67	3.21
White Fish	14.03	12.00	2.69	32.22	1.68
Total	100.00		19.14	319.22	16.60

> '*diving isn't allowed, but it's a necessity. We have families to feed. It's a problem because for example today, fishing isn't good because it's too windy. So you need to dive to be able to survive'* (CHA fisher interview 20/07/09).

This statement was reiterated by every fisher (finfish and shellfish) interviewed in Chachahuate in both 2007 (n=8) and 2009 (n=8), associated with claims that loss of earnings from shellfish had not been compensated for by fin-fishing or tourism. Collectively, the fishers in Chachahuate perceived (correctly) that their earnings had stagnated since the introduction of the management regulations, whilst earnings in the two coastal communities had increased. Additionally, fishers in this community believed that they were unfairly targeted by the Navy enforcers:

> *'They came and took away all my gear and made me pay fines back at the beginning. First it was 3 miles, then 5 miles, and now it's all of it. So I have no choice but to go out when no-one's watching (at night)'* (Chachahuate fisher interview 21/07/09).

Therefore, individuals would fish illegally in the CCMPA to avoid the Navy patrol, indicating that enforcement was another main driver for non-compliance with the fishing restrictions in Chachahuate.

4.5. Development of alternative livelihood options: ecotourism

The aim to reduce the impact of small-scale fishing on the CCMPA by providing alternative livelihood options focused on the potential of ecotourism following the reforms to conservation and macro-economic strategy. As discussed in Chapter 1, section 1.2.1, neoliberal reforms were primarily aimed to allow local user groups access to tourism-based economic benefits through the decentralisation of natural resource management, with the secondary aim to stimulate the local economy by increased marketization of resources (Buscher and Wandle, 2007). In the CCMPA, marketization of resources was mainly driven by international NGOs, developing homestays, restaurants, hotels and a dive centre (only in Rio Esteban). While alternatives were originally intended to benefit displaced fishers, this selectiveness generated inequalities within the communities where many households employed a fishing-derived livelihood strategy (section 4.4.1). Although community-wide benefits were created through increased levels of tourism,

cooperative fishers and community leaders gained the most income from homestays because they possessed better quality housing.

Previous alternative livelihood developments have failed because provision of capacity training to learn the necessary skills to manage a community-run project once the donor agency period of involvement ended was either not provided or not sufficient. Also, the Garifuna communities have a preference to work in committees for decision-making which means that no individual has overall responsibility for the project. While committees may theoretically promote democratic decision-making and equitable distribution of power, in reality, without a clear leader to make definitive decisions momentum to manage projects waned once the sponsor agency was no longer present. Although the communities were able to recognise these problems, corruption and lack of trust were blamed for poor leadership in alternative projects (Rio Esteban community leaders' focus group, 11/07/10).

There was a preference for external leadership from an outside organisation, which would provide guidance, executive decision-making power and drive momentum for the development of alternative projects (Rio Esteban community leaders' focus group, 11/07/10). Therefore, to access local markets through neoliberal reforms, local user groups required external drivers to stimulate the local economy. Although localised entrepreneurialism was evident in each community in the form of informal shops and services, all of these businesses were derived for individual profit through rational choice rather than for the collective benefit of the many. So, for alternative livelihood sustainability, communities need to develop a greater capacity for shared decision-making or develop an executive arrangement for decision-making. However, to achieve this sufficient social capital must exist for others to trust that executors are acting in the best interests of the collective good.

This equitable model for inclusion in the decision-making process was the basis for community development initiatives funded by Opwall. The main alternative development project in Rio Esteban was a community-managed dive centre. This project used donor funds to build the necessary infrastructure to set-up the dive centre, in conjunction with providing community capacity training to develop the skills needed to manage the centre. The project was also working with ODECO, a Garifuna representation group, to identify future potential community leaders

that would be trained in business and development skills. In this way, the project offered a long-term alternative development option, using the natural resources of the CCMPA for tourism. The project also connected the community to a local market for diving, benefiting from the reputation of the north coast of Honduras as a world renowned diving area. Although this project had not generated any socio-economic data to date, community support for the project was strong across all household livelihood types in the household survey (72%; n=34). Therefore, all households were aware of the potential benefits to be derived from ecotourism projects (as well as those directly involved in its management) enabling this project to serve as a blueprint for future alternative developments in the community.

NGOs have provided an important influence on community development projects in these communities (and throughout Honduras). While Opwall has endeavoured to provide continuous long-term engagement with the communities in this study, other NGOs that have previously provided the initial funding and impetus for alternative livelihood projects in the Garifuna communities did not provide the necessary capacity building to develop the community's ability to continue the project after the donor funding cycle ended. This created a cycle of dependency that impacted the entrepreneurialism in the communities as individuals became reliant on external sources for initial start-up funding, frequently stating that many ideas existed in the community but money was needed for implementation:

> *'We have so many ideas for (tourism) activities, the culture, food, dancing, the Cayos, taking people to the mangroves, taking them to see the howler monkeys, horse riding. But at the moment they're just ideas, we don't have the money to start them. We need someone to give us the money'* (Nueva Armenia community leader interview, 06/07/09).

Exacerbating this lack dependency was the expectation that returns of any investment would be quickly achieved (within six months). This reflected the short-term economy that dominated Garifuna culture. However, more importantly for the development of alternatives was the lack of trust between others members of the community outside the immediate household and network of close friends (discussed in Chapter 5 section 5.2.6), and the preference to have multiple livelihood options. This preference had developed over time as a mechanism to reduce exposure to economic risk when livelihood were dependent on natural resources, and since became

engrained in the working culture of the communities. Thus, the majority of coastal community respondents to the household survey in 2009 individuals were unwilling to introduce alternatives into their livelihood structure as a replacement of another option (Rio Esteban: 88%; Nueva Armenia: 74%). However, the majority of respondents would include an alternative project as part of their household livelihood structure if they could generate an equivalent or greater income than a traditional activity (Rio Esteban: 62%; Nueva Armenia: 60%), although these respondents were unwilling to spend more than 25% of their time and effort per week to alternative developments. Further exacerbating these findings was the preference to manage community projects by committees. These committees often lacked an executive voice, deferring decisions to different members to mitigate responsibility for failure. As a result, there was no one person with overall authority for a project, leaving it susceptible to neglect. In addition, committees often lacked momentum as members were all dependent on other activities for income which reduced the time available to fully support alternative developments.

In Chachahuate where alternative projects had been successful implemented, dependency on external agents for further developments was still a problem. Instead of investing income generated by the hotel and restaurant to build new latrines, community leaders approached WWF and TNC for funding. As recognised by a local NGO, aid dependency had actually stifled entrepreneurialism rather than encouraged it at a community-wide scale by raising expectations of entitlement:

> *'in 2006 after they were given the money for the hotel and restaurant, they wanted money for latrines. We said no, that they needed to start helping themselves, and use the profits from the hotel to pay for and build a latrine'* (NGO KI interview, 16/07/09).

This level of dependency was created as a result of the privatisation of the CCMPA. Communities were forced to embrace alternative livelihood options, with a strong preference for ecotourism developments. As such, the society-nature relationship was commodifed making fishing households initially reliant on external agents for project development, capacity building and management. Access to information, training and funding for such developments was controlled by the HCRF and other external agents which created this cycle of dependency, and lack of responsibility for community development.

At the macro-scale, tourism development became the focus of the national economic strategy following the damage caused by Hurricane Mitch in 1998 to traditional export products. The Honduran government embarked on a Poverty Reduction Strategy with the support of the World Bank, aiming to reduce severe poverty by half by 2015 (World Bank, 2006b). Macro-economic stability was supported through the Country Assistance Strategy to improve the performance of the financial sector and public sector financial management in the wake of loss of export revenue caused by the Hurricane. As part of the PRS was to reduce the impacts of natural disasters in Honduras, the government developed measures to mitigate these impacts primarily geared towards strengthening households' capacity to adapt their livelihood strategies through market-based mechanisms (World Bank, 2006b).

Following the adoption of these development policies to promote sustainable development at the local-level, tourism and natural resource management were identified as key sectors to pursue for economic growth. However, despite national tourism policies developed in the 1980s, it wasn't until 2005 that a National Sustainable Tourism Programme was initiated by the Tourism Secretariat (SETUR) and the Honduran Institute of Tourism (IHT). This programme identified the northern coast to be under-developed from a tourism perspective, and has since become one of the main components of macro-economic growth through national and foreign investment:

> *'this has been the will of the government – to increase tourism. There has been a lot of publicity for the Caribe Hondureño (Honduran Caribbean) paid for by the Inter-American Development Fund to help Honduras develop tourism infrastructure*' (Ceiba Tourism Office, 26/07/09).

A tourism development strategy was created to fully utilise the natural resources of the area, encouraging large-scale developments in the region (hotels, airports, road construction) to be supported by small-scale, locally owned service businesses (IADB, 2005). This model would provide regional economic stability through tourism development, environmental awareness and critically localised employment opportunities. Focus was placed on ecotourism and protected areas as the regional unique selling point (USP) for the Caribbean coast, and exerted significant influence on the strategic direction for protected area management and provision of alternative income options.

In spite of this agenda to promote sustainable tourism developments for both national and local economic growth, this strategic direction was vulnerable to external events crossing the social-ecological system boundaries. In 2008, the effects of the global recession were felt across the whole tourism sector in Honduras with total direct foreign investment having decreased by 5.6% (US Department of State, 2009) and an estimated drop in tourism revenue of 9% in 2009 for the Bay Islands alone (Utila KI interview, 02/06/09). On 29th May 2009 an earthquake of magnitude 7.1 struck Honduras, impacting the number of tourists visiting the Bay Islands and north coast by causing structural damage to road and building infrastructure. However, more significantly in June 2009, a military coup d'état ousted President Zelaya (Liberal Party of Honduras) over speculation of unlawful attempts to change the constitution. This action led to five months of social unrest and international condemnation of the interim government before a general election was held in November 2009. During these five months, all non-humanitarian foreign aid was suspended to the country and the World Bank paused all of its lending for development programs worth $80 million for the next fiscal year (Reuters, 2009). Although trade in export was reportedly unaffected by the coup, tourism was heavily impacted. The UK Foreign and Commonwealth Office advised against all but essential travel to Honduras until January 2010. Although this advice was later revised, the country remained in a state of political transition with further social unrest in the capital city, Tegucigalpa. In light of these events, international investment slowed, indicating a potential time lag between political stability recovery and economic recovery.

4.6. HCRF funding dependency – driver for community participation in the management process

The annual operating budget for the HCRF in 2007 was estimated to be approximately $800,000 including all staff, logistics and maintenance (HCRF KI interview, 20/07/09). Between 1993 and 2003 the HCRF received funding from AVINA[12] towards technical and logistical costs, while conservation and community-based alternative livelihood projects were supported by international NGOs (The Humane Society, US AID, WWF, TNC, Opwall). Yet in order to meet

[12] AVINA is a Swiss development agency, focused on the conservation of natural resources and sustainable development.

operational costs, it was necessary for the HCRF to '*take some of the (project) money'* to employ sufficient staff to manage the area (HCRF KI interview, 20/07/09). Its entire operational budget was derived from external sources, making it susceptible to the funding cycles of international donor agencies (Table 4.10). While financial accountability was required by each donor to justify the project costs, finances raised by the collection of entrance fees into the CCMPA were not transparent, contributing to the conflicts between the HCRF and the local communities. Entrance fees were first implemented in 2003 as a legal requirement for all protected areas under CONAP[13]to raise administrative capital. Before the law was passed, the HCRF informed the local communities that it was their intention to contribute 10% of the revenue towards community development projects. However, when the law was passed by Congress, it was decided that the entrance fees should be used to fund localised conservation initiatives to comply with regional protected area practices in Belize, Mexico, Panama and Costa Rica (HCRF KI interview, 21/07/06). Yet this decision was not communicated to the local user groups, and the Executive Board of Directors of the HCRF decided that budgetary information should not be made transparent to other stakeholders to 'prevent conflicts' over the proportional costs of conservation and funding for community development initiatives (HCRF KI interview, 21/07/06). Consequently, lack of financial transparency and accountability did not fulfil the principles of 'good governance' necessary for successful co-management arrangements. As a result, further conflicts were created between the local fishers and the HCRF.

Further to these conflicts, the management priorities of the HCRF were to promote self-sustainability to reduce dependency on external funding bodies. In 2007, financial independence was achieved when the CCMPA was used as the location to film 'L'Isla de Famosa' (Survivor), a reality television show produced by an Italian production company. The production company paid the HCRF an undisclosed sum to allow filming inside the CCMPA for ten weeks in 2007. Since then a further seven series have been filmed in the CCMPA for European and South American countries between September 2007 and October 2008. The filming of just one reality show reportedly generated around 70% of the annual HCRF budget, approximately $560,000

[13] CONAP is the National Council for Protected Areas, representing Honduras within the Regional Council for Protected Areas (Central and Latin America).

Table 4.10: Donor agency funds for the HCRF and associated projects since designation in 1993 (based on Castillo, 2008).

Year	Donor	Specific project focus	Main economic beneficiaries
1994-2005	AVINA	HCRF administration costs and conservation (until 2002). Staff training	Owners (until 2002), HCRF
1998	Texaco Caribbean	-	-
1998-2003	Inter-American Foundation	Community development	Local communities
1993-1999	Business leaders	Scientific research, infrastructure development	HCRF
2002-present	MarViva	Scientific research and network support	HCRF
2003-2007	Global Environment Facility (GEF)	Environmental education, sustainability, institutional capacity building and scientific research	HCRF, local communities
	Operation Wallacea	Scientific research, environmental sustainability and community development	
2004-present	The Nature Conservancy (TNC)	Conservation, scientific research, community development and financial sustainability, sponsor of adaptive co-management with HCRF (2008-2012)	HCRF, local communities
2005-present	United States Agency for International Development (USAID)	Environmental sustainability	Local communities
1999-present	WWF	Sponsor of co-management with HCRF (2004-2008), community development, environmental conservation	HCRF, local communities

(HCRF KI interview, 08/06/09). Not including any other source of income, these eight reality shows would have generated sufficient revenue to cover the entire HCRF budget for 5.6 years making the HCRF financially independent and sustainable for the short-medium term. However, more importantly, this financial independence enabled the HCRF to channel all monies received from donors directly to the intended projects:

> *'An important portion of our salaries now comes from the reality show, and it helps towards the high operational costs and patrolling costs. Its different money from the reality show because if the Foundation (HCRF) receives funds from WWF or TNC, those funds are under conditions which can't be used for salaries, or a small portion is allowed for the salaries of Elias (Head ranger) or the rangers. However, with the show we're given an amount of money and we can decide how to use it. Of course a percentage is paid as taxes and salary taxes, but nothing is paid to the government for filming the shows'* (HCRF KI interview, 08/06/09).

Thus, management of the CCMPA had economic stability for the next five years to implement community-focused alternative income developments alongside conservation objectives. This financial independence was highly rated by the TNC during the 2007 revision meetings for the management plan, believing the HCRF to be the 'most advanced' and 'successful' management agency for all their platform sites in the Mesoamerican Barrier Reef System (TNC KI interview, 08/07/09).

However, the reality shows effectively re-classified the natural resources of the CCMPA as a high value elitist tourism commodity, quite distinctly different to the one-day tourism written into the first management plan. There was a substantial increase in the number of European tourists to Honduras, specifically in the CCMPA, accounting for 48% of all visitors in 2009 (HCRF KI interview, 08/06/09). The HCRF believed that this provided greater opportunities for the local communities to derive an income from tourism. Nonetheless, tourists were primarily visiting only the cayan communities *inside* the CCMPA while coastal communities were unable to directly benefit. Additionally, the HCRF recognised that increased visitor pressure to the CCMPA caused problems for management to '*control what they (tourists) are doing'* (HCRF KI interview, 08/06/09). Visitor numbers have risen year on year since 2001, peaking at around

1200 in 2008[14]. This demonstrated a managerial problem to make sure that tourism was '*under control and the numbers do not exceed the capacity of the (CCMPA) product'* (HCRF KI interview, 21/07/06). As a result, increased tourism created a trade-off between environmental sustainability and community economic development.

In spite of the recent increased tourism revenue in Chachahuate in connection to this exposure, fishers from all three communities believed that they did not receive any direct monetary benefits from the reality shows in the protected area before 2008. Collectively, they claimed that the filming of the reality show contravened their rights to fish in the protected area during live transmissions without any form of financial compensation: '*when the reality (show) is there, we can't go out fishing and where is the money for us? Where is the development in our communities?*' (Fishers' representative, revision of management plan meeting 3, Jutiapa, 2007). The fishers believed that they should have been allowed to provide a transportation service for production personnel between the mainland and the CCMPA. Instead all transport was provided by the HCRF who received payment for this service: *'you didn't let the reality show use the boats of the communities, so all the money income is just for the Foundation'* (Chachahuate fisher, revision of management plan meeting 3, Jutiapa, 2007).

In contrast to these community perceptions, Magnolia reportedly did compensate the local communities in 2007, donating $700 per day of live transmissions (ten in total for one series) to each community school (total $7000 per community) (GAD, 07:1). In addition, three outboard motors were bought by the HCRF for the Santa Ana group of lobster fishers in Nueva Armenia to enable them to provide a shuttle service to the Cayos Cochinos for Magnolia staff (US AID KI interview, 18/07/09). However, significantly, none of these forms of compensation were corroborated by fishers in any community and no records of donations were available.

Yet the imbalance and inequality of the financial benefits from the reality shows between the HCRF and the communities perceived by the fishers was stark: $560,000 paid to the HCRF compared with $7000 paid to each community. As a result, the reality shows catalysed a decision by fishers across communities that much greater participation in the management process would

[14] In spite of the popularity of the Cayos Cochinos as a tourist destination, the earthquake and political instability in 2009 severely hampered visitor numbers.

be necessary to ensure that each community benefitted from the CCMPA resources from both traditional (fishing) and non-traditional (reality show induced tourism) mechanisms: '*it's necessary for us to have active participation on behalf of the communities to negotiate new contracts with the reality shows and because the Foundation is just a management office – we're the owners of the area'* (Rio Esteban representative, revision of management plan meeting 3, Jutiapa, 2007). The review of the management plan in 2007 provided the necessary window of opportunity for the Garifuna fishers to exert their demands and influence on the decision-making process.

The fishers' specific demands for participatory and socio-economic improvements in the second management plan included transparency of the contract between the HCRF and the reality show, investment in tourism-related training and infrastructure, the creation of a small loan program to encourage local entrepreneurship, co-ownership of MPA tourism developments, employment of locals for transportation and hospitality services provided to the reality show, respect for human rights, replacement of the current Reality Show negotiating committee with one that included members of the local community, and assurance that the environmental impact caused by the Reality Show would be minimal.

However, despite the shared ideology to create community-wide alternatives, the funds for development projects were perceived as compensation only for cooperative fishers who were representing the individual fishers during the management plan revisions: *'everytime a reality show finishes filming they give money for the fishermen, so twice a year we get about 19,000 lempiras, but only for those in the group'* (Individual fisher interview, 16/07/09). Individual fishers stated that they were offered compensation in the form of building materials, but that they were prevented from capitalising on this opportunity:

> *'after the reality show finished filming, someone from the company came over to here and offered us all the scrap wood to use for building. So we went over, loaded the boats, and then someone from the Foundation said we couldn't take it, even after it was offered to us. Then all of a sudden the wood disappeared. The Foundation took it',* (Individual fisher interview, 16/07/09).

Although the protest action against the reality shows derived some benefits, having been instigated and driven by representative cooperative fishers speaking on behalf of the whole community, it is important to recognise that information detailing outcomes of the action was held within this powerful elite community group. Cinner et al (2009) make reference to this layer of complexity that has become problematic in the CCMPA, recognising that there is a level of heterogeneity between different communities' dependency on marine resources, and between different groups within each community using those resources.

In the case of the CCMPA, decreasing dependency on natural resources for income and increasing dependency on remittances and non-traditional income generating activities (as detailed in section 4.4.1) reduced community-wide interest in the CCMPA. This lack of interest hampered participation efforts by the HCRF, but has also created a marginalised group of fisher specialists within each community. Therefore these fishers, on recommendation from community leaders as the 'most interested' group in the community, were targeted by the HCRF to represent the communities and participate in the management process as a registered cooperative. Alternative income options have been developed in tandem with only these few individuals, enabling fisher specialists to transition into fisher-generalists deriving a significant proportion of their income from tourism/non-fishing activities. This transition has been accompanied with an elevated socio-economic status in each community, helped by continual aid from the HCRF and other NGOs to develop alternatives to fishing.

4.7. Local-level drivers for participation in the process of management

Variables at the local-scale are mostly fast-moving variables, able to respond quickly to socio-economic changes being experienced in the communities. However, such fast variables tend to only work in short-term cycles which often does not allow for sufficient time to fully experience economic development. McClanahan and Castilla (2007) understood that communities traditionally dependent upon natural resources for a specific livelihood strategy are often unwilling to make short-term economic sacrifices (reduced fishing effort) for the long-term economic gain. Therefore, in the coastal communities, few fishers were willing to invest time and energy into long-term alternative developments unless they could be guaranteed fast returns

on their investments or external organisations would provide the necessary funding and resources (Skills audit, 2010).

In addition to this, McClanahan and Castilla (2007) recognised that livelihood options are part of a resilience strategy for artisanal households, and alternative developments that undermine this resilience without viable and perceivable economic benefits will be met with resistance. Therefore, a management regime that works to support occupational diversity would be more welcomed by local user groups. When coupled with social factors including equality of management benefits within and between communities, conditions at the local-level impact the viability of management policies for conservation and sustainable development through participation and compliance.

Across all communities, more experienced fishers (classified as having been fishing for 20+ years) were unwilling to stop fishing in favour of an alternative, stating that only old age or illness would make them exit the fishery because fishing is the 'culture, heritage and tradition' of the Garifuna. Importantly for the management process, this older group represented most of the specialist-fishers in the case study communities who have always derived their main income from fishing, and subsequently are the most reluctant to exit the fishery and re-train in an alternative activity. But, all of the community representatives working with the HCRF fall into this category, and are therefore the main beneficiaries of all alternative income developments. Yet even more important for continuing and future conservation of the CCMPA, is the participation of the younger generations in the management process. However, not only do the youth not want to fish themselves, they are actively encouraged by their (fisher) parents to pursue other occupations. Fishers do not want their children to suffer the hardships of a life dependent on fishing, describing it with various adjectives including 'hard', 'sacrificial', 'solitary' and 'lonely'. In this way, fisher specialists have worked hard to be able to invest in education for their children so that they can have a better life, preferring them to develop a salaried, stable profession. Consequently, fishing has been relegated from a prestigious traditional livelihood to an option only for those without the means to afford education or the capacity to benefit from education. Through this social and educational shift, children receive a

greater level of secondary education and are increasingly disinterested in being taught the traditional skills of Garifuna livelihoods or indeed living and working in their community:

> *'Now they're students and will study to become professionals. They're not all in fishing like they were before. Now they're carpenters and mechanics and fishing isn't the main way to make a living anymore'* (Rio Esteban Community leader interview, 27/06/09).

The community youth view fishing only as a 'quick way to make extra income' rather than an option to generate any stable income.

In management terms, this presented the HCRF with a contradiction between conservation priorities and practical solutions: the need to provide the older/more dependent fishers with alternative income sources yet these were more opposed to change; the need to include the youth to invest in alternative income developments yet youths were not interested in community-based activities. Thus, as a consequence of the older fishers wanting a better life for their children, cultural practices and knowledge actually weakened social cohesion and future socio-economic sustainability of the communities.

4.8. Conclusions

While local livelihoods sustainability has shifted from natural resource dependency towards ecotourism-based alternatives, tensions between specific sub-sectors developed within communities based on socio-economic stratification. These tensions emanated from inequitable distribution of income from natural resources of the CCMPA; inequitable income derived from alternative livelihoods; and marginalisation of fishers within the communities. As a result, participation in the management process was dominated by fishers with a higher socio-economic status in the communities, and non-compliance was dominated by individuals with a lower socio-economic status. These relationships with participation, compliance and socio-economic wealth were outcomes of the first management plan that did not reflect the socio-economic conditions of the local communities.

Socio-economic impacts from the first management plan also dominated the revisions of the second management plan to produce more favourable regulations for sustainable small-scale fishing. However, in 2009 households in the coastal communities continued to show a decreased

dependency on fishing-based livelihoods for income, instead pursuing generalist livelihood strategies. Despite the changes to the management plan, adapting to the socio-economic needs of the local communities, were these changes made too late? Evidence of livelihood strategies and dominant sources of income found that households are now more dependent on non-traditional livelihoods and remittances. In light of the relative wealth from fishing or out-migration and remittances, households were adapting to changing environmental and socio-economic conditions to reduce their risk exposure from traditional occupations. These patterns of changing socio-economic dependencies have reduced the need to participate in the management process for the CCMPA. Therefore, future participation with management has been jeopardised by a social shift away from traditional occupations.

In light of this emergent trend away from extractive dependency, several key questions emerge for the future of management for the CCMPA: is socio-economic wellbeing and culture more important to the local communities than environmental sustainability? If the answer is yes, then the future participation from local stakeholders in the management process will be compromised. In this event, both the co-management and adaptive co-management arrangements would not have responded to localised conditions, including the need for community-wide engagement with natural resources. If the CM management plan had been more inclusive, would community-wide participation in the management plan have occurred to generate shared understanding of the social-ecological system? Has the wider inclusion of community-level and meso-scale stakeholders in the ACM management plan generated sufficient environmental understanding to maintain management in the face of a social shift away from natural resources? These are all questions that cannot be fully answered without further research. In the next chapter we turn to the governance influences of the two management plans.

CHAPTER 5: CAPACITY OF CO-MANAGEMENT AND ADAPTIVE CO-MANAGEMENT TO ACHIEVE PARTICIPATORY GOVERNANCE IN THE CCMPA.

5.1 Introduction

The notion of governance goes beyond an analysis of institutions and regimes to include the relationships between the state and other important actors including members of civil society and private businesses. This seeks to address issues of accountability, power and participation from stakeholders to be responsive to social, economic and environmental needs. Thus, participation in decision-making processes by all stakeholders is recommended as a central tenet of governance (Constanza et al, 1998; Koontz and Johnson, 2004). As suggested by Olsson et al (2004) governance for social-ecological uncertainty is better addressed through collaborative processes which recognise multiple levels of stakeholders and corresponding knowledge relevant to the management process. Through such collaboration, emphasis on trust-building, institutional development for conflict resolution and social learning through experience and experimentation take ACM into the realm of governance (Doubleday, 2007; Armitage et al, 2008).

The CCMPA presents an ideal case study for ACM because it is a well-defined resource system (see Table 1.3, Chapter 1) which has relatively few competing interests. Since the privatisation of the Cayos Cochinos in 1992, the communities within the area of influence have enjoyed the exclusivity of extraction rights within the CCMPA. However, the management of the CCMPA has been marred by complexities, conflicts and institutional challenges. As a result, many of the core components identified by Armitage et al (2008), Jentoft et al, (2007) and Fennell et al (2008) for successful ACM: power and empowerment through participation and representation; trust building through network analysis and linkages; and social and institutional learning through information exchange and mechanisms for feedback to foster shared understanding- have not been achieved and many internal and external factors have caused the failure of ACM to achieve the desired management outcomes.

This chapter is a systematic analysis of the extent to which the core components of ACM governance identified in the literature are functional within the CCMPA over three periodic phases of management: 1. the first management plan (2004-2009); 2. the revision meetings

for the second management plan (in 2007); and 3. the implementation of the second management plan (2008-2012). At each phase, the extent to which the CCMPA case study embodies the core components identified previously has been evaluated through the lens of the enabling governance conditions for ACM. The influences of external agents and external forces on the management process have also been examined at each phase to assess the stability of the management regime. The outcomes of the governance process at each phase have been analysed for legitimacy, transparency, accountability, participation and empowerment (Rhodes, 1996).

5.2. First management plan (2004-2008)

5.2.1. Power and empowerment of stakeholders

The importance of leadership was recognised by Baland and Platteau (1996) and Olsson et al (2004a) to organise the power and responsibility within a governance framework. Empowerment of localised actors is both a condition and a goal of co-management for individual as well as collective levels in order to promote sustainable co-management. The enabling conditions for such empowerment include the participatory design, institutional arrangements and capacity by all stakeholders to learn and evolve (Jentoft, 2005). Therefore, the participatory structure, the selection of individuals and representation by key individuals of others are important enabling circumstances for power sharing within an ACM arrangement.

5.2.2. Participatory structure of co-management arrangement

Unlike other case studies of ACM, the HCRF was an organisation newly formed specifically for the role of managing the CCMPA. The previous institutional arrangements for natural resource management in Honduras needed to be re-organised to accommodate the new organisation. This re-organisation, although within the existing polycentric governance structure, completely restructured the framework of power and responsibility for management. The resultant hybrid governance arrangement of nested stakeholders represented an asymmetry of power between the state, the HCRF, civil society and private owners of the Cayos Cochinos islands and cays (Figure 1.1, Chapter 1).

The devolution of responsibility for natural resource management in Honduras from the state to NGOs in 1992 implied the principles of good governance to promote participation, accountability, and legitimacy (Rhodes, 1996; World Bank, 2006; UNDP, 2002). In reality,

devolution of responsibility from the macro scale (state) to the meso scale (NGO) maintained a hierarchical structure in spite of these governance ideals. In this case study, the role of the state was devolved to the municipality of Roatan for shared responsible of the CCMPA, but the HCRF had full accountability over the co-management arrangement because '*in Honduras the municipalities are just there for the press photos and leave (whichever) NGO (they are partnered with) to take full responsibility'* for management (local NGO KI interview, 30/06/09). The state did not monitor the participative capacity of the management process to have inclusion of local user groups within the decision-making process. As a result, local user groups were restricted to a consultative role with little influence or empowerment to participate in decision-making. The only objective in the first management plan was to 'harmonise cultural traditions with new development initiatives' (CCMPA management plan 2004-2008, p17), without making an explicit reference to community involvement in decision-making to ensure such harmony.

Moreover, the HCRF did not consult COHDEFOR, the Honduran government department with legislative responsibility over environment resources to approve the management plan. Without the required approval from COHDEFOR to legalise the management plan, the HCRF used political connections to present the management plan directly to Congress for authorisation. This act defied state regulation to produce a legally binding management plan, creating conflict with both state agencies and the affected communities:

> '*the plan was legal, but they didn't do it in the right way. What should happen is they send it to us, we make any changes necessary and send it to Teguc (Tegucigalpa) to be passed through Congress. But they just sent it to Congress so it bypassed here. They didn't talk at all to anyone. The trouble is, it takes a long time to create a management plan and the political people who own the grounds didn't agree the area should be protected. We first saw the new management plan on the internet'* (COHDEFOR KI interview, 14/06/07).

During the implementation of the first management plan, WWF had quite an influence on the process, providing both the financial resources and the methodology for the production of the plan. This international NGO did not have any assigned/statutory role within the governance structure, yet it dominated the governance regime through financial and operational inputs. The process exhibited weak involvement and empowerment of local stakeholders or locally derived knowledge. As stated by Armitage (2005), this implemented a high risk management

strategy because it lacked shared understanding at the local level that would foster compliance with conservation regulations. The complex interactions affecting this process will now be discussed.

5.2.3. Selection for participation of user groups

Following several years of antagonism between the HCRF and local communities as a result of a moratorium on all extractive activities during the embryonic years of the CCMPA, the HCRF was required to consult with local user groups to conduct a participatory consultation during the implementation of the first management plan. An opportunity to forge more amenable working relations with local user groups was presented to the HCRF in 1997 through the MODAPESCA project, administrated through DIGEPESCA. The project was only for the Department of Atlántida, but presented a timely opportunity for the HCRF to provide assistance and support to the artisanal fishers in two of the affected Garifuna communities: Nueva Armenia and Chachahuate. The HCRF facilitated community proposals to DIGEPESCA and the State to create fishing cooperatives within the two communities, a required condition for the project.

Information about the application process for MODAPESCA was passed to community elites via the traditional hierarchy of governance (Patronato) in each community. Patronato membership has traditionally been dominated by a few powerful (wealth and social status) families within each community. Thus, information was only passed on to individuals known to the Patronato in spite of the majority of households employing fishing within their income structure. Until this project, fishers had always worked as individuals, with little experience of working within a cooperative. Participation in this project established new cooperative fishers from pre-existing community elites, and the HCRF utilised these connections as community representatives. Although these groups received no capacity training to operate as a cooperative, each group of three was provided with a 25 foot motorised boat, fishing equipment (illegal to use inside CCMPA except under restrictions), but more importantly a new found status with the HCRF and within their own communities.

The creation of these new community leaders created social difficulties within Nueva Armenia, the community that had received the most direct assistance from the HCRF. A socio-economic and power stratification developed resulting in extreme dichotomy of wealth and connectivity between cooperative fishers and individual fishers. Cooperative fishers received double benefits of accessibility to fish more distant grounds (from motorised boats),

and connectivity to the management process of CCMPA. Fishers not in the cooperative received no benefits, so the cooperative fishers were able to exercise this power of information and connectivity over other fishers in the community to their advantage. It was also only these fishers in the cooperative who were invited to participate in management meetings to represent the interests of all fishers in the community.

Rio Esteban did not qualify to receive any support from the MODAPESCA project because it is not within the Department of Atlántida. Instead, the Patronato were asked to elect appropriate individuals to represent the community within the management process, agreeing to participate and thereby to at least connect the community within the governance system of the CCMPA. Representatives were selected by the community elites, influenced by personal connections within the Patronato.

5.2.4. Representation and participation in decision-making for the CCMPA

5.2.4.1. Community Committee

A Community Committee, comprising of two representatives from each community, was established during the implementation stages of the first management plan to provide a communication forum with the communities. This exchange of information was top-down, with the HCRF using the Committee to explain only the regulations and enforcement procedures. Although the Committee presented a vehicle for mutual understanding and information exchange between the two stakeholders, the HCRF did not sufficiently explain the conservation objectives for the CCMPA or account for the socio-economic implications these regulations would create. The local communities could not conceptualise the purpose of the regulations from the preservationist perspective, and the HCRF and fishers were positioned on different sides of the management process. Through this exchange, no individual from either sector had the capacity to share an understanding about the natural resource management problem, a critical component of ACM (Berkes, 2002; Armitage et al, 2008). Both stakeholders were entrenched in their own understanding based on their interactions with the social-ecological system: the communities' perspective limited to experiences of resource extraction for traditional livelihoods; the HCRF experience limited to preservationist conservation. Therefore, the existence of the Community Committee did not permit information sharing in bidirectional exchanges to promote a shared vision, but further entrenched the opposing discourses of the value of the CCMPA.

5.2.4.2. Nueva Armenia

Whilst the representatives of each community held personal links with the HCRF, they assumed that information would be passed to the other fishers within each community through the Community Commission. In fact, most information was being retained by those representatives, empowering key individuals within the management system and disempowering the majority of individual fishers impacted by the fishing restrictions. Instead of fostering a localised management structure through the empowerment of key individuals in each community, the inequality of power has created distinct winners and losers. This has been most acute in Nueva Armenia where individual fishers suffer a disparity of power, participation and access to important information between themselves and their cooperative representatives. The individual fishers stated during a focus group in 2007 that they believed this was because the cooperative fishers were working for the HCRF and did not want to present any negative feedback that could risk their financial benefits:

> '*only the group of los millionaires of Nueva Armenia are involved in meetings. They benefit from having a salary from the Foundation. They get paid to call on their radios and tell them when we leave and where we're heading. They use private radios so we don't know.*' (Nueva Armenia Individual fishers' focus group, 19/06/07).

In 2007, the same group of individual fishers interviewed accused cooperative fishers of deliberately not informing them about meetings with the HCRF in the community to prevent them from presenting negative impacts.

> '*we don't know anything about the management plan, we only hear things through the grapevine but we never know when any meetings are happening. Considering the number of fishermen in this community, why don't we know anything*?' (Nueva Armenia Individual fishers' focus group, 19/06/07).

However, despite these strong expressions of opposition to the fishing cooperative in Nueva Armenia and the HCRF raised in the focus groups, 100% of individual fishers interviewed in 2007 (n=11) stated that they were happy with the representation offered by cooperative members, and 7 of these respondents were happy with the mechanisms for communication with the HCRF. These answers reflect the different attitudes of the individual fishers to the two data collection techniques – individual interviews and focus groups (see Chapter 2, section 2.6.3). Many respondents believed that the individual interview structure was more

official, and their responses would be presented to the HCRF[1]. Conversely, the focus group offered a more informal environment with peer support and generated more open and honest responses. These different responses made me wary about more formal interactions concerning the CCMPA, suggesting that individual fishers are aware of the power inequity of information exchange between themselves and the HCRF. This dominant action by the HCRF in information exchange seemed to prevent individual fishers from feeling able to participate in HCRF meetings for fear that they '*wouldn't understand'* the discussion or have their opinions heard ('*they never listen to us'*, n=8, Nueva Armenia individual fishers focus group, 19/06/07). Therefore, individual fishers have a passive rather than active engagement with the management process because they do not trust the HCRF, and have not been provided with the technical training to feel able to participate fully.

Whilst this conflict between individual and cooperative fishers produced winners and losers within Nueva Armenia, another division opened up within the fishing cooperatives themselves, creating a more complex power hierarchy. In 2006, all cooperative members interviewed believed that they had 'an important role' within the community because the HCRF listened to their opinions (Nueva Armenia fishers' cooperative focus group, 31/07/06), and felt happy with the mechanisms for communication between themselves and the HCRF. However, by 2007 some of the cooperative members addressed their growing dissatisfaction with the level of representation through the Community Committee. The main cause for concern among the cooperative members was the weakening relationship with the HCRF, having become more perfunctory than influential: 'now we're only visited and told about changes, we're not even consulted anymore' (Nueva Armenia fishers' cooperative focus group, 19/06/07). These cooperative fishers also suspected that a certain member of the Community Commission did little to communicate these issues to the HCRF:

> '*they didn't like it when we tried to explain what's been going wrong, no one even tried to hear me. X talked too much with the Foundation but not to explain the real truth. The idea was that we had a Commission in every community but not everyone gets all the information. X gives too much information to the Director'* (Nueva Armenia fisher interview, 27/07/09).

[1] All respondents were provided with a written ethical consent form before agreeing to participate in an interview stating that all information given would be anonymous.

The Community Commission member was accused of cultivating a mutually beneficial relationship with the HCRF by creating a sub-level of corruption within the management framework. This speculation eroded the legitimacy and integrity of the management process in the eyes of the cooperative fishers in Nueva Armenia. It also weakened the standing and function of the Community Commission. As a result, although still formally recognised, the structure of the Commission dissolved because cooperative fishers no longer use this option for communication with the HCRF. However, instead of recognising this problem and finding a solution, the HCRF continued to communicate via Commission members. Although re-election for membership of the Commission was possible, personal relations and trust between members had dissolved beyond a capacity to maintain functional ability.

5.2.4.3. Chachahuate

Despite the existence of the Community Commission, fishers in Chachahuate did not believe that any regulation over fishing activities was necessary, and refused to participate with the HCRF. Representation was provided by two members of the fishing cooperative in Nueva Armenia through familial connections with Chachahuate. However, the majority of fishers during a focus group in 2007 (n=6) believed that their opinions had not been considered in light of the restrictions on diving, and because there was no simultaneous provision of alternatives to alleviate the substantial economic impacts:

> '*the only positive outcomes of it are for the Foundation. They take the bread out of our mouths and replace them with tortillas of air! They don't let anyone live in peace, but they don't help or give anything.*' (Chachahuate Individual fishers' focus group, 12/07/07).

Nevertheless, individual self-interest drove fishers to engage with the management process. Whilst the focus group revealed a community level aversion to participate with the HCRF, the individual interviews with the same fishers revealed a strong willingness to participate. Of the fishers interviewed individually in 2007 (n=8), 100% stated a desire to attend the management plan meetings as a mechanism to potentially change the management regulations (75% of responses) and improve their relationship with the HCRF (50% of responses). The community has received considerable attention from the HCRF and associated organisations to provide alternatives, as detailed in Chapter 3.

5.2.4.4. Rio Esteban

Representation of fishers in Rio Esteban has been the most equitable of all three communities. Individually, fishers recognised the value of forming a fishing group to participate in management activities, reflecting that 'many voices are more valuable than a few' (Rio Esteban Cooperative fishers' focus group, 28/07/06) to increase the legitimacy of communication with the HCRF. Importantly, 75% of respondents attended community meetings with the HCRF, with a corresponding level of agreement with the fishing regulations. Consistent representation has been maintained by an internal system of meetings and regulations to control the activities of group members. Members of the group clearly benefit from open transfer of information and discussion, and this more open forum has allowed extensive information to flow within the community, and 100% of fishers interviewed in 2007 (n = 8) were happy with their representation and the mechanisms for communication with the HCRF.

5.2.5. Trust-building

Relationships founded on trust and mutual respect between stakeholders in any co-management arrangement have been identified as critical factors for maintenance and progression (Pomeroy et al, 2001). Trust between community members, between different communities and between communities and the HCRF had been poor within the CCMPA as reported by community leaders (CL) and NGO staff (Nueva Armenia CL 09:3; Rio Esteban CL 09: 2; HCRF 09:2; SERNA 09:2). It is an important component developed over time and effective at multiple levels within a governance system: individual and household, community and organisational/institutional levels. The outcome of the maintenance of trust between multi-level stakeholders is acceptance and belief in the legitimacy of a shared management regime. In ACM, trust can be evaluated and measured through the emergence and maintenance of networks between stakeholders, social capital within local communities and horizontal and vertical linkages within networks.

5.2.6. Networks and social capital

5.2.6.1. Formal and informal networks

One of the reasons for the lack of trust between the communities and the HCRF was the use of formal networks within the communities to exchange information at the local scale, primarily the Patronato and the fishers' cooperatives or groups. In Nueva Armenia

information passed through these networks only reached selected members of those specific groups instead of all fishing households within the community, and this created a feeling of mistrust by individual fishers. The HCRF and cooperative members in Nueva Armenia did not exhibit any interest in building and maintaining the trust of individual fishers, and did not utilise the informal networks within the community to reach individual fishers.

Informal networks in Garifuna communities function on the basis of extensive mixed-gender membership enabling 'word of mouth' information exchange between households by both men and women. However, these informal channels rely on the willingness of those individuals holding the information to share with others. In the case of Nueva Armenia, the benefits of exclusivity of knowledge (power, income, status) appeared stronger than the willingness to share information, and individuals only trusted others within their familial groups (Nueva Armenia fisher interview 09:5; Nueva Armenia CL 09:4). Faced with these inherent social barriers, collective action would only be achieved when individuals perceived that they would benefit from participation.

5.2.6.2. Social capital

Social capital comprising of trust, reciprocity, social norms and associated internal community sanctions (Pretty and Ward, 2001) has been associated with outcomes of environmental regulations: in situations with high social capital, greater compliance with regulations and subsequent lower costs for enforcement can occur (Pretty, 2003). Such basic components of civil society have a significant impact on the functioning of ACM which is founded on trust between actors, acting as bridging and bonding agents to create and maintain ACM (Plummer and Fitzgibbon, 2006). Adger (2003) has argued that where state/formal institutions are weak, social networks can serve as important avenues for decision-making leading to conservation success. Yet to perform this function, the complex social relations producing community norms and networks of reciprocity must be understood, focusing on the role of social capital at the household level (Lansing, 2009). Although social capital analysis is not the main focus of this study, it has proved useful to evaluate and compare the levels of trust and cooperation within communities.

An analysis of social capital at household level in all three communities revealed that social networks exist based on household social capital (Lansing, 2009), dictating the level of information available to different individuals. Those households with the strongest links to community leaders and membership of more community groups had greater awareness of the

CCMPA and management. Logically, this suggests that the more socially active the individual, the greater their exposure to different sources of information. Yet, in the two coastal communities, knowledge of the CCMPA was greatest in those households with links to either the Patronato or the community representatives. These household links have been forged on trust and reciprocity between individuals in the belief that something would be gained from the relationship by giving something to another individual, i.e., information (Bourdieu, 1985). Following this principle, community leaders and representatives have access to the most valuable information for fishing dependent households via external linkages with the HCRF, government agencies and other NGOs. They maintain their status by only exchanging information with other households that have something useful to offer them in return. In this way, those households that are disconnected from such networks cannot access information through these reciprocal channels, and remain in a sub-stratum beneath these community elites.

5.2.7. Moving beyond networks - horizontal and vertical linkages

In addition to the importance of available networks and the strength of social capital within local user groups, in multi-scale systems (macro, meso, micro) the governance arrangement needs to be able to link local users and all interested organisations vertically and horizontally in pursuit of shared learning (Young, 2002; Ostrom, 2005). These linkages enable the current state of localised conditions to be understood by elite organisations to translate all knowledge into effective policy to achieve objectives (Grafton et al, 2006). These linkages will then enable a regular and (crucially) bidirectional flow of information to allow for shared understanding and articulation of resource problems to move governance beyond networks (Young, 2002).

5.2.7.1. Micro/Local scale

Before the creation of the CCMPA, fishers maintained good links within communities and between communities, respecting traditional boundaries for fishing grounds. But since the introduction of the CCMPA and the exclusivity of the marine resources to be shared between the communities within the area of influence, these horizontal linkages have been weakened because fishers have been forced into competition with one another for resources. Traditional fishing grounds were not respected by the zoning patterns within the management regulations, a situation that has ‘caused some friction’ (HCRF KI interview, 16/06/09) between communities. The fragility of trust, already problematic for community participation

in management, was eroded because all fishers targeted effort in the most valuable/abundant fishing grounds still available outside of the closed zones. The zones closed incorporated more ground traditionally exploited by fishers from Nueva Armenia. In response to this loss, and garnered through the concentrated focus on Nueva Armenia by the HCRF, a special diving zone for spiny lobster was designated exclusively for the use of fishers in Nueva Armenia in the first management plan.

This small allocation of exclusivity only for the benefit of one user group had a significant impact on the perception of legitimacy and transparency of the management process by fishers in Rio Esteban. Relations between fishers in Nueva Armenia and Rio Esteban became more difficult and competitive. Cooperative fishers in Rio Esteban were aggrieved that they had not also been allocated an exclusive diving zone to protect their livelihoods because 'they (fishers from Nueva Armenia) can still come and take our lobster and we can't say anything, but if we go there its trouble' (Rio Esteban Cooperative Fishers' focus group, 22/07/07). This provides an example of the potential problems caused from privatisation of resources that were once open access. In this case study, respect for each other's traditional fishing areas has been erased by exclusive rights of access as privatisation has increased the competition for resources. Access rights were not distributed equitably between communities and this created new conflict between user groups.

Moreover, the inequitable distribution of extraction rights created the perception of stronger vertical linkages between fishers in Nueva Armenia and the HCRF. As forwarded by Wade (1994), by having greater visibility with the HCRF, fishers in Nueva Armenia have generated specific benefits for themselves at the expense of the greater functioning of co-management and traditional horizontal linkages with other fishers in the community as discussed in section 5.2. In addition, the weak vertical linkages between the HCRF and the communities restricted the information exchange between the two sectors, which is discussed later in section 5.3. Indeed, the local communities had few vertical linkages with organisations involved in the governance network for the CCMPA. Nevertheless, despite the strength of horizontal linkages that existed between communities before the creation of the CCMPA, fishers in all three communities recognised the importance of the HCRF for the protection of marine resources, which were threatened by the scale of industrial trawling in the area, and the communities did not have the visibility, connections or capacity to protect these resources. The prohibition of industrial fishing in the area, introduced when the CCMPA was declared a marine reserve in 1993, has been enforced by the vertical linkages of the HCRF with

government agencies, the Navy for enforcement, and the municipality of Roatan. It is widely acknowledged in the communities that continued protection of the CCMPA from industrial trawling could only be maintained through these connections by the HCRF.

5.2.7.2. Meso/NGO scale

As the organisation responsible for the management of the CCMPA, the HCRF has the largest network of linkages. Of all these links, the strongest connection is with the group of business leaders who own the Cayos Cochinos islands, who form the Board of Directors for the HCRF. While this connection does not exert a strong influence on the decision-making process for managing the CCMPA, it represents the shortest link to Congress via personal relationships with the Board members. These connections provide vertical linkages with both the state and international organisations, generating access to funding bodies and recognition of conservation efforts. It was these political connections that permitted access to the Navy for enforcement (HCRF KI interview, 28/06/07). An additional connection at the meso-scale which also provided vertical and horizontal links for the HCRF was WWF Honduras (the national body of WWF Central America). Association with WWF during the first management plan allied the HCRF with other regional and international NGOs, which elevated the status of the HCRF as a conservation organisation.

The weakest connection on the meso scale existed between the HCRF and the Municipality of Roatan. This connection should have represented the strongest relationship within the governance arrangement as partners within the co-management arrangement, but involvement with the municipality has been minimal. Nevertheless, this weak link holds a critical position in the governance structure because it provides the legal mechanisms and policy instruments by which the HCRF can administer and enforce regulations. Therefore, although not influential on the process of management, this linkage provides the structural support for management mechanisms and application.

A further horizontal link at the meso scale was with REHDES[2] (meaning network), a collection of NGOs each managing protected areas within the Department of Atlántida. By linking with other NGOs in the same geographical area, principles of best practices for

[2] Honduran Ecologist Network for Sustainable Development

management and conservation could be developed through shared experiences and innovation. Although this link was not continuous or important within the governance structure for the CCMPA, it offered an important opportunity to learn and adapt from a wide network of participation and engagement experiences with user groups to help strengthen the vertical linkages with the Garifuna communities. However, REHDES became defunct after two years because it did not provide vertical links or direct access to funds: the NGOs involved in the network did not input sufficient time or enthusiasm into the process, failing to recognise its potential.

The most important connection for the HCRF at this time was generated through a connection between the Director and a producer working for CNN in Honduras. This connection provided the link between the HCRF and an Italian production company (Magnolia), reaching an agreement to film the reality show 'Survivor' within the CCMPA. This connection generated both positive and negative responses to the reality show, but lifted the profile of the CCMPA to international levels. It also served as a catalyst to strengthen the vertical linkages between the communities and the HCRF, and instigated the revision of the first management plan.

5.2.7.3. Macro/international scale

Within the governance structure of the CCMPA at this time, the Honduran state had the weakest linkages with all other sectors, providing conceptual guidance for the implementation of governance, but limited operational and financial resources. Despite this State governance still played a significant role in the process of management, providing the methodology and finances for the first management plan through WWF and AVINA.

5.2.8. Social and institutional learning

Social and institutional learning is essential both for the process of ACM and for the outcomes of ACM to enable all stakeholders to solve problems at increasingly larger scales (Berkes, 2008). Such learning is postulated to become stronger over the mid to long term as social networks are formed and trust accumulates to create environments of mutual respect and cooperative relationships. However, as Armitage et al (2008) warn, such process-oriented approaches have high associated transaction costs (policies and outcomes) in the short-term, with the intention of developing long-term benefits of mutually agreed policy and decisions. In addition such arrangements carry a high risk of failure that collaboration and trust will not

be gained and vulnerable stakeholders could bear the costs. Social learning means the ability of individuals and groups to learn from their mistakes and to use the experiences to adapt and change, but this depends on the ability of individuals and their social networks to innovate (Fabricius et al, 2007) and show willingness to change.

In order to promote social learning, the enabling governance system must allow for information exchange; feedback mechanisms; different social constructions; and validation of knowledge to develop a shared understanding between stakeholders of the social-ecological environment. Such shared understanding is critical to enable double-loop learning (Torell, 2000; Pahl-Wostl et al, 2007; Armitage et al, 2008; Berkes, 2009) to change underlying values and beliefs. Such learning implies a sense of common purpose and ultimately to facilitate cross-scale institutional arrangements.

The first management plan (2004-2008) was sanctioned without a sufficient shared understanding between all stakeholders of the natural resource problem in the CCMPA. The local communities understood the natural resource management problem through the socio-economic impact on their livelihoods and their collective knowledge of the social-ecological system has been based on experience and validated through social comparison with others. By contrast, the HCRF and WWF constructed their own knowledge of the natural resource problem through technical discourse which was validated through scientific rigour and biological significance. Although the HCRF and WWF created the first management plan based on their own discourse, the relevant scale of conceptualisation around species preservation did not match the relevant scale of livelihoods. As a result of these different conceptions of the resource management problem, fishers have been cautious to provide any information to the HCRF, fearing that it would be detrimental to their fishing activities:

> '*it's not good for us to give information to the HCRF because if we give them nothing, they can't take anything away.*' (Rio Esteban Cooperative Fishers' focus group, 23/07/07).

This is because the HCRF, while dominant in decision-making, was not perceived as legitimate in community terms.

Participation and power within the first management plan was based on the HCRF's construction and validation of knowledge. Cooperative fishers in Nueva Armenia were able to share the same understanding of the conservation measures as the HCRF because their

participation with management was validated through individual economic returns in exchange for their support of management measures. Importantly, even without having access to information and limited participation with the HCRF, the majority of fishers from all communities showed willingness to learn about the ecosystem (Nueva Armenia, 66%; Chachahuate, 100%; Rio Esteban, 100%). Whilst this willingness may not translate into behavioural changes, it indicated a willingness to move beyond the single-loop learning of resolving singular problems through agreed management measures. Critically, at this stage it was the HCRF that needed to show willing to change its perspective, and to understand the values and behaviours associated with the community level partners. This potential for double-loop learning by both the managing institution and civil society was catalysed by the influence of several external factors as discussed in section 5.5.

5.2.9. Regulatory mechanisms

To achieve the desired outcomes for conservation and social development objectives the HCRF needed to have economic, regulatory and collaborative management measures. Coordination with the Municipality of Roatan as co-management partners provided access to economic, legal, and judiciary processes through which management policies were administered. Enforcement and monitoring of those regulations was performed by the Honduran Navy making the CCMPA the only protected area in Honduras to have a military presence. Personal contacts between the private owners of the CCMPA and members of Congress generated the enabling legislation to utilise four Navy personnel on rotation to patrol the area. The Navy personnel work in tandem with the HCRF resource guards to perform daily patrols, with the ability to seize catch and equipment or arrest individuals (NAVY KI interview, 18/07/06). Whilst the Navy initially provided a deterrent against illegal industrial trawling and narcotics trafficking in the CCMPA, some artisanal fishers feel persecuted by the guards. Feelings of victimisation were strongest in Chachahuate, the community living inside the protected area. During a fishers' focus group in 2006, one participant emphatically stated that:

> '*Last year they (Navy patrol) came, wearing masks during the day. They put masks on their faces and threatened two or three people to leave the island. We reported it but we feel it came from the Foundation. 16 people came over! The Foundation is trying to destroy us*.' (Chachahuate Individual Fishers' Focus Group, 29/07/06)

This statement illustrates that not only do the residents of Chachahuate believe that they have been threatened by the Navy, but they associate such threats with the HCRF. Feelings of mistrust and violation of both fishing and occupational land rights are directed towards those organisations holding the most power within the CCMPA governance structure.

Similar feelings were expressed by individual fishers during a focus group in Nueva Armenia in 2006, voicing concerns that the Navy personnel changed the rules at will:

> *'Someone was free-diving in the Cayos area and they got rough with him. They change the rules everyday, we have no knowledge of what they're going to do.'* (Nueva Armenia Individual Fishers' Focus Group, 01/08/06).

However these individual fishers also admitted to fishing without a Municipal or HCRF licence, and were therefore not officially entitled to fish within the CCMPA. By contrast, no fishers in Rio Esteban or cooperative fishers in Nueva Armenia expressed any problems encountered with the patrol guards or Navy personnel. Unsurprisingly, the cooperative fishers in Nueva Armenia stated that they had a positive relationship with the enforcers because they are known to the HCRF. However, these fishers did believe that no fishers (from the communities awarded access rights to the CCMPA) should be asked to provide their licence details (Nueva Armenia Cooperative fishers' focus group, 31/07/06).

These enforcement procedures have changed the behaviours of fishers in Nueva Armenia and Rio Esteban, favouring fishing grounds *outside* the CCMPA in order to avoid confrontations with the patrol. Whilst these behavioural decisions have also been the result of beliefs that productive fishing grounds exist outside the protected area as discussed in chapter 4, focus groups conducted in 2007 also revealed that many fishers felt that the profit derived from fishing activities inside the CCMPA did not outweigh the potential losses generated as a result of patrol inspections (Nueva Armenia Individual Fishers' Focus Group 01/08/07; Rio Esteban Cooperative Fishers' Focus Group, 07/08/07). Additionally, one individual fisher in Nueva Armenia admitted during a focus group that he fished 'only at night to avoid being shot' by the Navy (Nueva Armenia Individual Fishers' Focus Group, 01/08/07). As a result, a reduction in daytime fishing effort inside the CCMPA, appearing to support conservation measures, was being countered by an increase of fishing effort overnight. The regulatory and enforcement measures encouraged non-compliance because they did not produce equitable or positive outcomes for individual fishers.

Licences have been the main regulatory measure to control artisanal fishing activity within the CCMPA. The HCRF issue licences only to fishers who have a municipal licence issued through DIGEPESCA. Whilst the HCRF licence is free, fishers must pay 40 lempiras (roughly US$ 2.22) for a municipal licence and 1000 lempiras (roughly US$ 55) for a boat captain licence. Many individual fishers do not register with DIGEPESCA despite this nominal charge, and are therefore not eligible to receive a licence to fish inside the CCMPA. Without this identification, fishers are at risk of prosecution every time they enter the CCMPA. This has shifted much of the fishing effort from these individuals from the daytime to the night time when the Navy do not patrol the area. Night patrols were only performed occasionally to control narcotics trafficking (NAVY KI interview, 14/08/07), implying that the control of artisanal fishing effort to enforce compliance with regulations was a secondary concern to the Navy patrol.

This system of regulating fishing effort within the CCMPA has been detrimental to the conservation objectives of the HCRF because many fishers actively fishing in the CCMPA are not registered. In effect the HCRF did not have an accurate register of fishers in each community, nor a functional mechanism through which to monitor community fishing effort (number of boats, number of fishers). The system has also been undermined by lack of resources from the State through DIGEPESCA to monitor fishing activity both inside the CCMPA and in surrounding waters. As a result, there is no risk incentive to register for a licence because the chance of being caught and fined is minimal.

5.2.10. Role of external agents

Several external agents have had an influence on the management process. For example, Opwall, a scientific research organisation, has been providing ecological and socio-economic information to improve policy and regulations since 2004. The visibility of Opwall in the communities has provided a vehicle through which the local user groups have been able to express their opinions concerning the management process and outcomes. This facilitation role has been important because open and accessible channels for communication between the HCRF and the local user groups have not existed. As discussed above, individual fishers and other members of the community have been reliant on community representatives to pass information between these two groups, and these links have often generated poor results. Therefore, in order to be heard the communities have sought other communication channels. Although the communities have harnessed Opwall to act as an agent of change, this vehicle

was not influential enough to facilitate change because it has been obliged to present community perceptions of management through objective and neutral channels (following positivist methodological principles).

As recognised above, the CM arrangement did not successfully create or institutionalise a dialogue for communication between the HCRF and local user groups within the realm of local-level understanding/conception. Without these important channels for feedback between the micro and meso-level institutions, local communities failed to achieve 'institutional participation' in the management process. Instead as a response they attained 'political participation' as described by Charnoz (2010). He discerned that when a stakeholder group are not being heard within a hybrid governance system such as the CCMPA, they will collectively voice their discontent in public spaces to provoke a crisis. By creating this public conflict, such groups gain the political power to re-negotiation of the rules of the management game. The result of 'political participation' is often a form of new institutionalism that engages with greater participation. This form of 'voice' response exemplifies the predictions made by Hirschman in 1975 (discussed in Jentoft, 2000) that fishers would exhibit two kinds of reactions in response to a management regime (such as, CM arrangement) not representing their interests – 'exit' responses by non-compliance with regulations and 'voice' responses by using peer group protests to influence managers.

The opportunity to demonstrate this political 'voice' was expressed through multiple communities' involvement with Grupo de Apoya y Desarrollo (GAD), a development NGO working expressly with Garifuna communities on the north coast of Honduras. 'Voice' strategies are dependent on institutional arrangements which allow fishers the right to express concerns and perceptions of mistreatment. In this case study, GAD performed a bridging function between the HCRF and the communities because it was able to connect the dominant technical understanding of management with the social situation of the communities. A similar function was performed by OFRANEH and ODECO, two Garifuna representation organisations working to connect communities with the state in order to defend their claim to traditional land. Through the technical capacity offered by these three organisations, the local communities united to respond to shared difficulties.

5.2.11. Role of external influences

5.2.11.1. Land rights

As indicated previously, land rights have contributed to the participation, communication and representation of local communities with the management of the CCMPA. A long-term dispute for ownership of the title deeds for Chachahuate and East End has marred the management process since the privatisation of the CCMPA. Both communities are assets, privately owned by AVINA and a Honduran businessman respectively. Led by OFRANEH (a radical protest action group) and ODECO (a conservative organisation) the Garifuna have applied for the title deeds in order to protect their land rights to these communities. The issue raised the profile of the Garifuna, the CCMPA and the HCRF to national and international audiences through political and legal action. This issue was brought to a climax in 2007 when a petition was filed by OFRANEH at the Inter-American Court for Human Rights (IACHR). The court ruled in favour of the Garifuna, awarding them the title deeds for both settlements, which were upheld by the Honduran government. As a result, AVINA donated Chachahuate to the community via the HCRF, significantly improving relations between the two sectors. Furthermore, the HCRF lobbied the owner on behalf of Rio Esteban to reciprocate the gesture for East End. In spite of such political pressure, it took a further two years for the owner to formally acknowledge the legal ownership of East End by the Garifuna residents[3]. The profile generated for the communities by these land right disputes created a position of political power within the management structure of the area, providing another vehicle through which to voice their objections to the privatisation of the area and subsequent management. However, the campaign to maintain land entitlement to both communities was undermining the conservation efforts in the CCMPA, because housing for the future sustainability of the community/population was a more pressing need than the future sustainability of the resources inside the CCMPA.

5.2.11.2. Social instability at community scale

Ostrom (1990) indicated that the key to successful co-management arrangements (albeit for common property regimes) was to gain ‘compliance of generation after generation of

[3] Since this recognition Griffiths has instigated a new legal dispute to overturn this result based on Municipal land classification which would nullify the Congressional decree upholding the IACHR ruling.

appropriators', ensuring the sustainable use of natural resources for future generations. This is also the central tenet of sustainable development (WCED, 1987; Jones, 1994). However, in the CCMPA there is an emergent problem of migration and societal shift away from traditional resource use which has the potential to undermine any management arrangement. The move away from traditional activities by the community youth towards non-traditional more stable occupations is evident in all three communities, as discussed in Chapter 3. This shift has been instigated and supported by the 'last' generation of fishers because 'fishing is very dangerous', offering a 'difficult and uncertain life' because it is 'unpredictable and random'. The most frequent reasons stated by fishers for entering the fishery were 'lack of alternatives' and 'traditional activity'. However, these same fishers have worked hard to invest in education for their children so they do not have to fish, enabling them to pursue 'more stable' occupations:

> '*at the time when I first came here to work with my dad, we had no money so we were obligated to fish. It wasn't lucrative but it was a living. Now fishing can pay for the education of my children. If they wanted to come with me and fish that's fine but I would hope that they have something else*.' (Chachahuate fisher interview, 15/07/09).

In conjunction with education, the majority of youth in each community emigrate to the USA in order to generate enough money to fund a comfortable lifestyle on returning to Honduras for themselves and their families:

> '*you can go to the States for ten years and save up $20,000. Then you can come back here and live like a millionaire for the rest of your life!'* (Chachahuate individual fisher, 27/07/10).

This widespread preference to pursue non-traditional occupational structures has meant that fishing is no longer a desirable activity, but is performed by a last generation of fishers who have been actively discouraging involvement by their children. As reported by Agrawal (2001), demographic change influences the ability of users to create rules, access management or manage resources. The social changes occurring in the Garifuna communities have weakened the cultural bond with the CCMPA and traditional extraction of marine resources, and reduced the potential future capacity for participation in the management process. Newer cultural lifestyle choices of non-traditional occupations that generate greater income are dominating the communities, and changing the social-ecological relationship with the CCMPA.

The changing occupational structures in the communities have also created a dependency on monetary remittances rather than traditional occupations, reducing the interest or perceived need for maintaining or developing environmental knowledge. There is a danger that passivity for environmental awareness will also create passivity towards participation in management as a learned condition. Economic community progression threatens the success of natural resource management because communities are losing future environmental leaders.

5.2.11.3. Political instability

Over the course of the first management plan, the governing party changed from the National Party of Honduras (2001–2005) to the Liberal Party of Honduras (2005-2009). While no significant changes were made to environmental policy during this transition, the staffing of all government agencies did change because civil servants are afforded no protection against changes to the governing party. A key informant working at SERNA illustrated the impact such staff turnover can have on organisations and management processes:

> '*when we have an election it's my role, the providers, who change most of the time. It affects the whole dynamics of relationships with the communities, all the work we've done will be hit. The hardest part is understanding why this happens when you have people who are decent, hardworking, dynamic and honest. They are just removed so the whole process doesn't really go anywhere'*. (SERNA KI interview, 11/06/09)

The knowledge and understanding of specific problems generated by individuals in organisations involved in natural resource management is therefore lost every four years because information at devolved governance levels is not shared between political parties. Removal of knowledgeable individuals prevents governance processes from progressing beyond these electoral cycles. This has been the experience of another key informant working for DIGEPESCA who was '*working in a beer bottling factory when the Nationals were in power'*, but was brought back to his position within the organisation and expected to '*just pick up where I'd left off'* (DIGEPESCA KI interview, 16/07/07).

Underlying the instability created by governmental changes is the perceived corruption that permeates through all state activities, damaging the ability of devolved government agencies to apply for international funding for environmental or sustainable development projects. A key informant at a regional government office stated that '*we write funding proposals, but*

ask for the money to be sent directly to us, not through the government because if it goes through government, we wouldn't get the money but we'd still have to manage the project'.

Further political instability exists at the local scale, where the Patronato members are subject to re-election every two years by legal requirement. Additionally, the same individual cannot hold the same position within the Patronato consecutively. While this promotes democratic leadership within the communities, it creates a problem for the HCRF in maintaining relationships with community leaders to participate in management functions. As has been detailed above, this relationship has often resulted in delegation of responsibility to fishing elites as community representatives.

5.2.11.4. Financial instability

The financial instability of the HCRF has had the greatest impact on the management of the CCMPA. Connections with CNN led to the agreement for the filming of five shows of the reality show 'Survivor' in the CCMPA between 2007 and 2009. The production offered mid-term financial security for the HCRF to enable it to fulfil its conservation and community development objectives. However, environmental damage, violation of the regulations for the area and impacts on community fishers generated a strong response from the Garifuna, and provided the catalyst for a review of the management plan, and the impetus for the local communities to empower themselves to have a far stronger participatory role in the management process.

5.2.12. Outcomes of the first management plan

During this instability, it is apparent that the HCRF has been the only organisation within the governance arrangement of the CCMPA to have maintained consistent participation in the process, even maintaining the same personnel. However, HCRF commitment to the longevity of the management process was because of its statutory obligation to manage the CCMPA, not because of any commitment to the co-management arrangement. Moreover, there are also high risks associated with such longevity of connection to the place or regime: stagnation, institutionalisation and a reduced openness to change and adaptation. By contrast, is the CCMPA itself because political and social pressure to develop more appropriate and acceptable regulations has driven the organisation to accept its mistakes and adapt to a more equitable distribution of power within the governance structure.

The first management plan was a poor imitation of a co-management arrangement, demonstrating inequitable distribution of power between stakeholders, limited capacity for social learning and insufficient will or commitment to generate trust for the management process. Key leaders and individuals engaged in the management process have been more willing to promote their own personal agendas rather than participate in a shared collective action for the sustainable management of the resources of the CCMPA. The failure to develop the capacity of participants at all governance levels at the start of the process fostered this culture of individualism rather than an interdependency to promote cross-scale information and feedback. Social learning has been limited to single-loop learning of specific management issues as opposed to collective stakeholder and institutional change.

5.3. Management plan revision meetings

As discussed above, the political pressure forcing the HCRF to revise the management plan was ignited by the reality show because 'the fishermen didn't agree with it, and they didn't know who was benefiting from it' (DIGEPESCA KI interview, 16/07/09). However, an historical lack of shared understanding of the natural resource problems and subsequent need for conservation regulations fuelled the fires of conflict between the HCRF and local resource users:

> *'the communities are asking (us) for the use of resources they need to survive because the regulations have restricted the use of those resources. The Foundation hasn't really gone in there and really explained why they need to have a management plan and why they use different zones. In the simplest way this would have reduced the conflicts*.' (Regional government officer KI interview, 08/07/09).

In recognition of these failures of the participatory requirements for co-management in the first management plan, the HCRF instigated a more open and pluralistic process to revise the management arrangements. Influenced by political pressure, the HCRF were forced to embrace criticism and develop a more equal dialogue with micro-level stakeholders. In 2007, four meetings were held between May and July with relevant stakeholders to review the current management regulations and outcomes using socio-economic and ecological criteria. The outputs from the meetings would then be incorporated in a revised management plan to reflect the current social-ecological conditions of the area.

Active participation in the management revision meetings has been critical for evaluating the effectiveness of the ACM regime. I participated in two of the management revision meetings (June, July) held in 2007. Observations of the distribution of power between stakeholders, participation during revision sessions and social and institutional learning during this review process provide a critical analysis of the necessary governance conditions for successful ACM to exist in the field.

5.3.1. Power and empowerment of stakeholders

5.3.1.1. Participation in the decision-making process

In 2007, two years earlier than originally intended, the HCRF organised a review of the management plan in order to make necessary revisions in light of the protestations by the local communities. This process was funded by the TNC after it selected the CCMPA to be one of their regional 'platform' sites within the MBRS MAR program for biological sustainability and community development. The methodology developed by the TNC was a rapid appraisal of the socio-economic and biological conditions of the area using a multi-level participatory structure. The TNC became the main sponsors of the second management plan, and the dominant stakeholder in the review process through both regional and international connectivity. However, importantly, the TNC personnel facilitating the review meetings were unaware of the reality show and the resulting fractured relations between the HCRF and the Garifuna communities until the *third* meeting in June. Though, the CCMPA would still have been selected as a platform site because of the biological importance of the area in spite of these social and political problems (TNC KI interview, 26/08/07). Yet, of greater significance for the review process was the lack of involvement of WWF. WWF personnel did not support the HCRF's decision to permit filming for the reality show inside a protected area, but were still subjected to widespread international condemnation because of their involvement in the CCMPA:

> *'We supported the first management plan, but this situation with the Reality Show has changed that. In the end the result was low impact in an analysis of the area compared to other impacts in the area. I don't agree with the reality show….We had problems, receiving emails from Italy and Spain WWF because it was a protected area'*. (WWF KI interview, 23/08/09)

Whilst this pressure created a conflict of interest for the continued involvement of WWF in the CCMPA, the organisation did participate in the review process in a technical advisory capacity and has pledged a commitment to continue to work with the technicians in the HCRF:

> *'We'll remain involved because there needs to be coordination between the managers of protected areas, and we need to help the communities. And too often funders pull out and there is no follow through'* (WWF KI interview, 23/08/09).

The participation of WWF in this reduced function demonstrates the potentially negative consequences of macro-scale linkages at international levels, because the inherent necessity to protect the needs and reputation of the organisation comes before a local-level co-management arrangement[4].

The main difference evident between the first management plan and the revision process to create the second management plan has been the much greater participation by relevant government agencies with legal responsibilities for fisheries, the environment and protected areas. Proactive involvement by these stakeholders improved the legitimacy of the process by providing the legal functions that represented the interests of both the state and local communities. However, despite this greater involvement of meso-level agencies the Municipality of Roatan once again did not actively participate in the review process. It has not been possible to arrange an interview with a representative of the municipality throughout the duration of this project, therefore (deliberate) persistent lack of involvement in the CM arrangement is only speculation by myself. A local government informant implied that Roatan officials would only be interested in the CCMPA if mass-scale tourism was developed:

> *'Roatan formed a cruise ship port for tourism and only thinks of the Cayos Cochinos as another destination. It doesn't provide any financial support at all'* (KI interview, 17/07/09).

[4] It should be recognised that the Honduran staff of WWF believed that the HCRF was sufficiently financially independent by 2007 to qualify for continued funding from WWF for conservation and sustainable development projects.

However, whilst tourism is the major industry of Roatan and the other Bay Islands, this does not provide a sufficient explanation for the lack of participation with the CCMPA. Perhaps more of an issue for the co-management arrangement of the CCMPA is the geographical spread of the local stakeholders involved in the process over three Departments. The location of the communities within three different Departments is further complicated by the relative magnitude of stakeholder involvement from communities and organisations on the mainland compared to the Bay Islands. All government agencies working with the HCRF are representatives of the Department of Atlántida (despite there being equivalents in the Department of the Bay Islands) because there are proportionally more communities within the area of influence of the CCMPA within this Department. Therefore, representation in the co-management arrangement in favour of the Municipality of Roatan does not balance the actual governance structure of the CCMPA.

Participation in the management process by local resource users included the same three main communities, and the representation from each community had not expanded or changed from the original contacts. This was surprising considering that the initial impetus for the revision of the management plan included community-wide development at a Garifuna/ethnic scale. Without participation by members of each community within the area of influence and members of each Patronato, fishers from Nueva Armenia, Rio Esteban and Chachahuate were therefore representing all development interests of all the communities as well as fishing-derived income. In spite of the political pressures to recognise the importance of social conditions at the local-scale, the HCRF made little attempt to connect the Patronatos with the process beyond initial invitations. As a result the same individuals from each community, some of whom had previously only represented their own personal interests, were now in a position of much greater influence over the management process. This had the potential to undermine or breakdown the new management plan should the majority of local users disagree or be disadvantaged by the outcomes, while other individuals benefitted. In this situation, the lack of previous effort by the HCRF to generate links with local user groups or to understand the socio-economic conditions within each community would have made such disproportionate representation impossible to comprehend until after any changes had been instigated. Actual community representation will be discussed in the next section.

5.3.1.2. Representation during management revision meetings

Representation of government agencies during the revision meetings was disparate between agencies, the result of financial resources and personal relationships with the HCRF. SERNA and ICF (formally COHDEFOR), the agencies with state authority for the environment and protected areas, consistently attended the meetings with the same personnel. This continuity reinforced the horizontal linkages between state-oriented conservation and the HCRF, and provided a catalyst for social learning through individual learning. The openness of key individuals from each agency to expert and non-expert knowledge generated a more holistic understanding of the social-ecological interactions that influence stakeholder conceptions of the CCMPA. DIGEPESCA, the government department responsible for all fishing activity, did not consistently attend the meetings despite invitation to participate in the process from the HCRF. Although lack of funding was given as the official reason for non-attendance, it was believed that personal relations were the main driving factor:

> *'It's to do with the invitations we receive from the HCRF. It has also depended on the leaders assigned to DIGEPESCA. We've experienced lots of problems with changes to the government policies so sometimes even if we receive an invitation we're not given permission to go'* (DIGEPESCA KI interview, 15/06/09).

Such personal relationships have a critical impact on the institutional learning and capacity of adaptation because interpersonal attitudes block/prevent openness to information exchange for subsequent policy adaptation.

Representatives from the Municipality of Roatan did not attend any meetings in spite of being the state co-management partner for the CCMPA as discussed above. The Municipality of Roatan have never given any support to the HCRF but do provide the legal framework through which enforcement measures can be regulated, and therefore the Municipal co-managers do enable management measures to enforce the regulations for conservation and fisheries management. In this capacity, it was not implicitly necessary for the Municipality to participate in the revision process because they provided consistent political and legal conditions to implement management policies.

ODECO and OFRANEH, two of the representative groups that provided a voice for the Garifuna communities and were instrumental to the instigation of a review of the management framework ,were not invited to participate in the revision process because they

did not have direct influence on the CCMPA. However, the linkages fostered between each organisation and community members were utilised to provide support and guidance to the community representatives during the revision phase.

In their capacity as facilitators and managers, the HCRF and TNC were consistently represented during the revision phase. This enabled joint and coordinated organisational learning through the enlarged network of stakeholders participating in the decision-making process. Albeit through a forced engagement, the HCRF as an institution was exposed to the perceptions of multi-level and multi-scale organisations, and was embedded in the information exchange between these stakeholders.

As outlined in section 5.2.1.1, there was a surprisingly low participation of local user groups' from the communities in spite of their political empowerment generated by the protest action against the filming of the reality show. The TNC (through linkages generated by HCRF) invited 'over 40 community members' from all of the settlements within the sphere of influence of the CCMPA, and expressed concern for the apparent 'lack of interest' and 'underwhelming attendance' of invitees (TNC KI interview, 27/08/07). Sambo Creek and Corozal did not have any representatives at the meetings. Although both communities no longer generate a dominant household income from fishing activities within the CCMPA, they have developed economies dependent on their rights of access to the CCMPA for tourism, and any changes to the regulations concerning alternative developments and ecotourism would have implications for their communities. Communication between the HCRF and these communities uses formal channels to inform the Patronatos of changes to regulatory measures, and this has the potential to weaken the ACM process because double-loop learning to effect social change cannot occur between these primary stakeholders.

Although the lack of participation by Sambo Creek and Corozal was not surprising, the low number of attendees from Nueva Armenia, Rio Esteban and Chachahuate was unexpected. However, there were three underlying factors that contributed to this poor attendance. First, the revision meetings were held for two days every month between May and July in 2007, and commitment to participate in the meetings was difficult for local fishers because the main lobster fishing and agricultural seasons are during these months. The individual incentive and necessity to generate income for the household as a fisher has greater importance than the collective action to participate in the revision meetings. The potential loss of income from fishing or farming over the total eight days would not have been compensated for by any

other organisation, creating an unfair pressure on individuals to risk their own income for the benefit of the whole community. Therefore, a disparity emerged between the economic sacrifice of community representatives and the resultant influence and power over the management process. Powerful stakeholders, who have historically had the most influence within the co-management framework, such as, the HCRF, received their salary during their attendance without sacrificing influence or power over the decision-making process. Local-level participation in the revision meetings would have been higher if the meetings were held during the off season for fishing, or loss of income was compensated for by other stakeholders. Either eventuality would have produced a truer participatory process. Instead, the revision process illustrated a mis-match of scale between participation with management and the impact of the outcomes for different stakeholder groups: local user groups suffered the greatest impacts but had the least power in the decision-making process, whereas non-local stakeholders suffered the least impact but wielded the most power.

Second, the emergence of a stratification of power within the communities, and poor internal communication of information has created a lower level sense of disengagement with the management process, producing a feeling of helplessness and associated apathy in many fishers. Even those fishers who have individual relationships with the HCRF did not regularly attend meetings. The Community Commission, the formal mechanism for participation and information exchange with the HCRF, was the main form of representation used by the communities during this process. However, throughout the four meetings representation was inconsistent because individual circumstances and needs of its members dictated attendance. The TNC believed this had an impact on the ability of other fishers to understand and participate because 'some fishers are much better at passing on information than others' (TNC KI interview, 08/07/09). Importantly, no Patronato members from any community participated in the meetings. This illustrates three problems facing management for the CCMPA: 1. a loss of dependency on the CCMPA manifested in a loss of perceived importance of conservation and sustainable use by community leaders; 2. a disengagement by the local governance structure to participate with the HCRF because communication has been directed towards and cultivated with elite fishers; and 3. political change within the local governance structure as community leaders are re-elected every two years, destabilising links with the HCRF that have been forged through personal relationships.

Third, the struggle to gain the title deeds for East End, which had created a tension between the community and the island's owner, coincided with the timing of the third meeting in June

2007, and also coincided with a widespread illness in the community. Although never discussed with outsiders to the community, traditional folklore and spirituality play a significant role in Garifuna beliefs of the cause and effect of many situations affecting the communities. The sudden and widespread onset of the illness in East End was believed to have been instigated by the owner to drive the residents away from the community. Such belief in witchcraft led the Shaman from Rio Esteban to perform a cleansing ritual in East End. To offer support and strength to East End, many of the community representatives from Rio Esteban had gone to East End to assist with 'casting out the evil spirits'. The secretive nature of these traditional beliefs meant that this prioritisation of the health of East End over participation in the meeting was not explained to the other stakeholders at the meeting. As a consequence the TNC, HCRF and other institutions assumed a lack of interest in the process from both communities. I was informed of the situation via connections with community members, because I have demonstrated a capacity to empathise with the cultural traditions of the Garifuna through my (limited) involvement within their society.

5.3.2. Social and institutional learning - information exchange and feedback mechanism

Regardless of the local-scale political influence that instigated a review of the management process, technical discussion groups dominated the proceedings used the discourse of the meso-scale elites, which excluded the local user groups from fully participating in the sessions. Although, the discussion groups were formed by mixed stakeholders to allow social learning, in practice the Garifuna were in the minority, with elites creating an intimidating environment through which to express their opinions. The sessions were served by the TNC using pre-selected topics to rank the greatest threats to specific habitats over the next ten years, and subsequent management options correspondent to the threat level. These topics were of little significance to the Garifuna because the information was not within the sphere of understanding or experience of the communities, and the time frame was significantly longer than the short-scale economies through which the Garifuna conceptualise the social-ecological environment. As a result, Garifuna participants gave all threats and associated management measures middle scores (2 or 3 out of a 5 point scale), giving the impression that they did not feel strongly about any of the discussion topics. Moreover, there was little exchange of knowledge of ideas by different groups because topics were only discussed by one group.

On the other hand there were also opportunities for social learning during the plenary sessions at the end of each day of meetings, which were used as a mechanism for group feedback to all participants and subsequent questions and answers. For instance, during the last plenary session for the third meeting, both SERNA and COHDEFOR admitted that they had not heard of the reality show before that day, and encouraged the community members present to speak out about the problems they had marginally voiced during group discussions. Key individuals from Rio Esteban and Nueva Armenia used the opportunity to voice their objections to the reality show, including loss of income, loss of propriety over resources and loss of respect for the HCRF. In support of the communities, a representative from GAD raised concerns over the ecological impacts of the reality show and the inadequate use of fines to pay for the biological damage. A WWF representative also reiterated the community position to point out the regulation violations incurred by the reality show, which are normally punishable through the court system for Garifuna.

In the two weeks before the third management plan meeting, interviews were conducted with individuals from the TNC, WWF, HCRF, FUCSA, and the representatives from each local community attending the management revision meetings, to identify and rank their main priorities for participation in management. This was to establish the extent of shared understanding of ACM functions and outcomes for management between meso-scale organisations and micro-scale user groups as the strongest actors in the current hybrid governance arrangement for the CCMPA. FUCSA is another local NGO with managerial responsibility for a wetland protected area (Cuerlo y Salado) that neighbours the CCMPA. Their responses were included to provide an objective control opinion of ACM, having previous co-management experience with the same governmental organisations as the CCMPA, and also with neighbouring Garifuna communities. The results indicated that although power and knowledge remained largely at the meso-scale level during the revision meetings, the NGOs shared the same priorities for management (Table 5.1) as the community groups (Table 5.2). Both stakeholder groups ranked representation of participants, participant influence on decision-making and transparency of the process as the three most important factors for successful acceptance and willingness to participate in the ACM process. Both groups also ranked relationships between stakeholders as the most important factor for the process of ACM to be effective, and a shared sense of ownership of the resultant management plan to be the most critical factor for the outcome of ACM to be successful.

Table 5.1: Collective responses for ACM management priorities from environmental NGOs in the CCMPA region. The factors ranked most important by all respondents have been highlighted in grey. Key: HCRF: Honduran Coral Reef Foundation; TNC: The Nature Conservancy; COHDEFOR: Honduras Forest Development Corporation; FUCSA: Cuero y Salado Foundation (wetlands reserve).

Category	Factor	HCRF	TNC	COHDEFOR	FUCSA	Total
Acceptance	Representation of participants	2	3	5	1	11
	Participant influence on decision-making	1	1	3	7	12
	Transparency of process	3	2	1	2	8
	Legitimacy of process	6	4	2	6	18
	Shared common values	7	6	6	3	22
	Responsible leadership	4	7	7	4	22
	Local knowledge	5	5	4	5	19
Process	Accessibility/participation	6	6	2	6	20
	Structured decision-making	5	4	3	3	15
	Cost effectiveness	1	5	6	2	14
	Stakeholder relationships	2	1	1	1	5
	Involvement of local government	4	2	4	5	15
	Involvement of external agents	3	3	5	4	15
Outcome	Sense of ownership of management plan	1	1	3	1	6
	Sense of continual participation	2	2	1	3	8
	Compliance	3	3	2	2	10

Table 5.2: Collective community representatives interview responses of management priorities for an ACM arrangement. The factors ranked most important by all respondents have been highlighted in grey.

Category	Factor	Rio Esteban	Nueva Armenia	Chacha-huate	Total
Acceptance	Representation of participants	1	2	4	8
	Participant influence on decision-making	2	1	1	4
	Transparency of process	3	4	3	10
	Legitimacy of process	7	7	5	19
	Shared common values	6	3	7	16
	Responsible leadership	5	5	6	16
	Local knowledge	4	6	2	12
Process	Accessibility/participation	3	2	1	6
	Structured decision-making	4	3	3	10
	Cost effectiveness	6	6	6	18
	Stakeholder relationships	1	1	2	4
	Involvement of local government	5	4	4	13
	Involvement of external agents	2	5	5	12
Outcome	Sense of ownership of management plan	2	1	1	4
	Sense of continual participation	1	2	2	5
	Compliance	3	3	3	9

What these highlighted ranked results indicate is a shared understanding of the meaning of management, and a collective agreement for the most important processes through which to achieve these outcomes between managers and local communities. However, they do not share the same understanding of the important factors for *delivering* a participatory process of management, adhering to the principles of good governance – legitimacy, transparency, and equity. The community representatives stated that accessibility to the management process was almost as important as the relationships between stakeholders, ranked second of the factors associated with process (Table 5.2). Without either of these elements working in conjunction through an equitable distribution of power, information cannot be exchanged to improve a shared understanding of social-ecological issues. In contrast, the NGO respondents ranked accessibility and participation as the least important factor facilitating the process of management, placing cost effectiveness as their second most important factor (Table 5.1). Thus, the participatory process for the revision of the CCMPA management plan was deemed inadequate by both community representatives and NGO respondents.

It became clear that the influences that drive an understanding of the social-ecological system are different between governance levels, and influencing conditions are measured in unequal degrees. The meso-scale takes administration and legal factors into consideration, whereas the micro-scale conceptualises the system through terms of accessibility and respect. In this case study, there is considerable capacity for double-loop learning at all levels, but the process to generate that capacity remains weak.

In spite of the limited capacity of the management revision meetings for shared understanding and social learning, the meetings did provide a vehicle for considerable information exchange focusing on the needs of both the ecology and community development over the next ten years. The TNC were hopeful in 2009 that the more inclusive style of governing, giving community representatives the opportunity to voice their concerns and opinions, had promoted more active and widespread participation in management:

> '*as people get more involved in the process and start to care more, they are more in contact with the Foundation. Some people are trying to do something good for their communities, and believe in the work that's being done so they can keep it going*.' (TNC KI interview, 27/08/09).

A key informant at SERNA held a similar opinion that the management process and continued communication between the HCRF, government agencies and the communities has

significantly improved the governance system for the CCMPA, and created a co-management precedent to put local user groups at the centre of the information exchange and review process:

> *'communities now don't believe in projects if its just been a technician working with them. They've been lied to by NGOs too many times. Only by talking to a community does it improve the relationship and lets them see that you do what you're saying you're going to* do' (SERNA KI interview, 14/06/09).

The process of reviewing and adapting the management plan of the CCMPA was most beneficial to the government agencies that have statutory obligations for the environment, because they were given the opportunity to implement national assessment procedures in a system that had already undergone considerable experiential learning. This enabled the state to strengthen its control over the management of protected areas, and deliver transparency and accountability for international funders. The meetings were also beneficial for the local communities because the restrictions imposed on fishing activities were reduced based on socio-economic conditions. Previously closed areas to fishing were re-opened, the size of the no-take zone around the Cayos islands was reduced, and fishers were to be employed as boat captains during filming of the reality shows. These changes were hailed as a victory by the communities, and considered as an example of the importance of the inclusion of social conditions for agreement and acceptance of management by local stakeholders.

5.3.3. Role of external agents

External agents played an integral role in generating the window of opportunity for a review of the management plan for the CCMPA. However, during the revision meetings these agents played only a supporting role to the communities because they were not directly involved in the process. As mentioned in section 5.2.10, GAD were invited to participate in the meetings because they fund community development projects, and were able to voice opposition to the reality show and lack of community consultation. One external agent that hugely influenced the revision process was the TNC[5] because it provided the drive and enthusiasm to reinvigorate the stakeholders, enabling new connections to be created between multi-level partners by providing an objective perspective on the relationships between stakeholder

[5] Although this international NGO sponsored the second management plan, within the context of the governance arrangement for the CCMPA it is an external organisation.

groups. The TNC provided an important link connecting the communities with the management process because it was not connected to the corruption and mistrust permeating the relationships between all other stakeholders. So, the use of an external facilitator gave the revision process transparency and trustworthiness, and encouraged a willingness to participate.

5.3.4. Outcomes of the revision process

In this case study, micro-scale user groups have had significant influence during the exchange of information in the revision phase, despite the fact that these groups remained outside the actual decision-making process. Whilst the socio-economic information provided by these groups was considered a driving force on the outcomes of the second management plan, policy decisions were taken at the meso-political level within the boundaries of technical discourse. This process produced a legitimate management plan at the appropriate scale for national and regional recognition, connecting the HCRF with important conservation partner organisations. The outcomes of the revision process also generated a management plan that was considered legitimate by the local user groups, incorporating the changes that were demanded to benefit and promote the livelihoods of the affected communities.

However, for a second time, this management plan did not meet all of the necessary conditions to be considered an ACM regime. Despite using the experience and knowledge gained from the mistakes of the first management cycle to adapt to changes in the social conditions, the second management plan has two major faults. 1) The balance of power within the hybrid governance structure remains in favour of the HCRF and the Municipality of Roatan, permitting the local user groups only a collaborative role in decision-making. So the devolution of management responsibilities - including enforcement and policy decisions remained at the meso-scale. Without the empowerment of local communities that comes through inclusion in management regulation, the sense of ownership and responsibility for protection of resources is greatly diminished. 2) The plan contained weak conservation regulations that did not include assessment of all the available ecological data. In light of the intensive political and social pressure on the HCRF to redress the social balance, the review of environmental conditions became a secondary priority. As a result, the management focus of the CCMPA has not found an appropriate social-ecological equilibrium, instead moving from a discourse of preservation to a discourse of social inclusion.

5.4. Second management plan (2008-2012)

Following the socially-driven changes to fishing regulations and conservation targets, the second management plan is now tasked with maintaining multi-level participation by all stakeholders in order to achieve its objectives. In 2009, an interview with the TNC revealed that if believed the key to this success was local-level participation in the governance structure of the CCMPA:

> '*The management has a structure including the different owners of the cays, the communities, the local authorities, they're all part of the committee. So now we're trying to reinforce and enhance the participation of the communities in that process. We're trying to put it together so that the participation of the communities gets stronger for that part of the project*' (TNC KI interview, 27/08/09)

It was believed that this more central role in management would 'help to promote compliance' with the fishing regulations because the communities 'are seeing the benefits of alternative tourism projects' coordinated by the HCRF. Although insufficient time has elapsed to fully assess how effective the second management plan has been in achieving its objectives, we can see some early indications of its performance.

5.4.1. Representation and participation in management

Community representation has largely remained stagnant, with the same individuals participating during management meetings. However, the transfer of information between representatives and fishers in the communities has been improved. In 2009, 100% of fishers interviewed in Nueva Armenia (n=8) were aware of the new management plan, although only 40% of these fishers were familiar with changes to the regulations. Similarly in Rio Esteban, 100% of the fishers interviewed (n=6) were aware of the new management plan, and 85% of these fishers were also familiar with the regulatory changes. However, in Chachahuate more than half of fishers interviewed (57%, n=7) stated that they were not aware of the new management plan and subsequent regulatory changes. This illustrates the lack of participation by Chachahuatan fishers during the revision process. Nevertheless, 100% of these respondents (n=21) felt that their relationship with the HCRF was poor and stated a willingness to participate in management meetings to improve this, provided the HCRF came to the community. In both Nueva Armenia and Rio Esteban 100% of respondents expressed a commitment to participate in the management process, preferring to attend meetings

themselves rather than trust a community representative. While these results indicate the potential to improve the current level of understanding through participation, it clearly indicates that the level of trust in other community members to represent collective interests remains poor in all three communities.

While Nueva Armenia was the most powerful community participant during the first management cycle, this position has been reversed in the second cycle. The corruption issues between cooperative members fractured the fishing cooperative, causing it to become defunct. In addition, the political and social stability in the community has been compromised by a conflict between two rival groups claiming legal status as the Patronato of the community. So, micro-scale social problems have been more of immediate concern for the community representatives because they, as community elites, are embroiled in the leadership conflict. Without a recognised Patronato, the community are also unable to participate with the HCRF through formal mechanisms.

Rio Esteban has now become the most powerful community to participate in the management process. The leader of the Community Commission is now one of the key individuals to have represented the community throughout the two management cycles. In 2010, a community audit was conducted, surveying the social capital available in Rio Esteban to support future development projects. The leader of the Commission was mentioned by 87% of respondents (n=35) as the most trustworthy person in the community to represent collective interests. However, this level of trust in one key individual may lead to dependency on their continued involvement in the management process, and induce a feeling of apathy towards participation in other community members.

5.4.2. Trust-building

5.4.2.1. Networks

The stakeholder networks created during the first management cycle and revision meetings have remained largely the same. Rio Esteban has maintained the largest network as the central focus for community development projects with the HCRF and Opwall. Community leaders have also maintained links with ODECO and OFRANEH for specific community development projects, and actively sought to improve relations with the Municipality of Colon to generate funding for future infrastructure projects (Rio Esteban community leader interview, 11/17/10). Nueva Armenia has maintained links with ODECO and OFRANEH,

but linkages have weakened between the HCRF and Opwall. Chachahuate has also weakened its connections with the HCRF and OFRANEH since it was awarded the title deeds to the community. However, the tourism developments in the community provide linkages to different organisations through sponsorship and capacity training. There is evidence that different foci for networks have emerged in all three communities since the emergence of tourism developments within the CCMPA to prioritise socio-economic community development over resource conservation.

The limited scope for alternative projects during the first phase of management to benefit only fishers, who were believed to have been adversely impacted by the fishing restrictions, highlighted the lack of social understanding of the social conditions in Garifuna communities. While the CCMPA management process can be credited with instigating alternative livelihood options, it is now in danger of being superseded by internal community development objectives. However, through this change in focus, the social capital available in each community had also changed. Community-wide participation in alternative developments has enabled the whole community to participate in and benefit from projects. As a result, a greater sense of collective action to achieve benefits for a majority of community members, as opposed to the few selected fishers, has strengthened the belief in co-management arrangements.

5.4.2.2. Social capital

Social capital, taken to mean the rules and norms within communities associated with use of natural resources, has been extensively linked to the likelihood of the long-term governance success of MPAs (McCay and Jentoft, 1998; Rudd *et al*, 2003; Jentoft *et al*, 2007). Yet taken in the context of one of a suite of 'capitals' possessed by households, social capital can also represent a household's access to resources via linkages with other individuals /households/institutions (Lansing, 2009), making it more likely to be able to absorb unexpected shocks. In this way, Lansing suggests that an individual's network of reciprocity and exchange (taken to represent a household) constitute a form of social capital that enables marginalised households to maintain diverse livelihood activities. This would have important implications for governance of the CCMPA as a new avenue for information exchange using both formal (Patronato) and informal (household) channels.

Such social capital is based on trust between individuals to act in a reciprocal manner, as opposed to trust that representatives will act for the collective good. In 2009, trustworthiness

of the Patronato and other individuals in the three communities was measured in the household survey, to gauge the potential effectiveness of cooperatives for both fishing and alternative developments reflecting the social capital of households. The results discussed below suggest that trustworthiness was based on socio-economic status and ethnicity.

5.4.2.3. Rio Esteban

The partial social capital analysis included in the household survey in 2009 indicated positive trends in Rio Esteban, whereby 50% of respondents (n=48) stated that the Patronato was the main source of community information, and 88% of those respondents believed that the Patronato members worked for the best interests of the community. When asked if most people in the community can be trusted, 64% of respondents believed they could, and 66% of respondents stated that people work better in cooperatives because they can see the economic benefits. However, active participation with groups relating to different community needs, i.e., environment, tourism development and infrastructure, shows a weak but visible relationship with race. Traditional income-generating activities are associated with Garifuna, and so representation and participation with the HCRF has been dominated by Garifuna. In contrast, infrastructure and community development is dominated by Ladino community members. This suggests that whilst community-wide social capital was relatively high, group membership and participation is based on traditional association and relationships.

5.4.2.4. Nueva Armenia

In Nueva Armenia, partly as a result of leadership problems social capital has been weakened by internal conflicts. In 2009, only 34% of respondents (n=48) believed that other community members could be trusted, and only 28% of respondents believed that the community would benefit from working in cooperatives. These results are not surprising because numerous cooperatives here have failed in the past. One community leader believed that cooperatives can only function with four or five members because:

> ‘*not all people understand that to earn money you have to buy a few things and then sell them again, so for that reason not anyone can have the capacity to do it. It would be chaos if everyone wanted to be involved in it. Things here work better individually, then you don’t have problems’* (Nueva Armenia community leader interview, 17/07/09).

The same leader also noted that they ‘could never have a community meeting to discuss a cooperative’ because the majority of the community lack the abilities to perform the necessary roles. What this statement highlights is mistrust of others and a lack of willingness by community elites to provide opportunities to develop a cooperative capacity. The power hierarchy and weak social linkages between community elites and the rest of the community prevents strong social capital or effective micro-scale governance. Without these basic functions, this community will continue to encounter difficulties participating in meso-scale governance systems.

5.4.2.5. Chachahuate

In Chachahuate, where social capital has traditionally been higher because of the smaller population size, evidence from 2009 suggests that the level of trust of others in the community has remained fairly constant (78%, n=20). The existence of tourism-based alternatives since 2007 has also given the community experience of working in cooperatives, meeting the conditions of the funding provided by WWF and TNC. However, when asked if people work well in cooperatives, a divergence of opinion can be seen between genders, where 60% of respondents who believed that cooperatives function well were all the female respondents. In contrast, the remaining 40% of responses who believed that working as individuals produces better results were male respondents. The women work within cooperatives to manage tourism projects but the majority of the men are not involved in these alternatives and continue to pursue fishing related activities as individual fishers. This difference is important for future participation in the management process of the CCMPA, highlighting both the need to provide capacity training for fishers and also to enhance the role women can play in the process to provide a more participatory function.

5.4.3. Social and institutional learning

To allow for effective ACM, constant social and institutional learning should occur through bidirectional information exchange and a shared understanding of the social-ecological system. SERNA and ICF are the institutions that have achieved the greatest level of continuing social learning after the revision meetings. National governance measures to achieve more participatory and transparent communication with local user groups have established new internal auditing for all protected areas, reviewing the effectiveness of management using ecological and socio-economic indicators. The audit enables these two government agencies to monitor the progress of management within protected areas to meet

national targets for conservation and sustainable development. The review process uses an ACM framework to annually evaluate management success through the lens of all multi-level stakeholders, with particular focus on local communities:

> *'Once we've gone through the assessment process we involve the communities to make sure we are coming up with information. You can't come up with a solution from just certain types of information which isn't benefiting the communities. You have to incorporate them in the process so you get a consensus assessment'* (ICF KI interview, 19/06/09).

Whilst this process generates substantial institutional learning in devolved government agencies to 'provide accountability, standardisation and to realise an area's strengths and weaknesses', it also generates information exchange between multi-level stakeholders. This has the potential to build crucial trust and legitimacy in participatory governance, especially at the local level.

The question to ask after the introduction of the more socially-driven management plan is: do the communities feel that they have achieved a social victory? If the answer is yes then further acquisition of knowledge and social learning might be at risk because the community perception of the social-ecological system has been justified, potentially inciting complacency. The willingness of the Garifuna communities to engage with the management process was strongest during periods of crisis, implying that social learning and participation are driven out of necessity rather than mere preference. The horizontal linkages between communities have slackened since the introduction of the second management plan, and community leaders admitted that communication with CCMPA stakeholders has only been prioritised when 'there has been an issue to sort out' (Rio Esteban community leader, 18/07/09). Therefore, when united by a common enemy – such as the HCRF, the reality show - Garifuna communities have worked with cultural solidarity and collective action. This is confirmation that the capacity for social learning exists in the communities, but requires a common goal to generate a strong response.

5.4.4. Regulatory mechanisms

The regulatory mechanisms for management have remained largely the same in the second phase of management, but have been developed through a more collaborative process, and support for the regulations has increased in all three communities, as documented in

Chapter 4. However, despite this increased support for the regulations, support for enforcement of the regulations has not shown a similar trend. Individual fishers in Rio Esteban still believed in 2010 that the enforcement procedures are unfair and randomly implemented to victimise locals ('it's too difficult to fish inside the area now, it's too regulated and not worth it'). This sentiment was echoed by other fishers claiming that problems with enforcement have been a contributing factor in their decision to concentrate fishing effort outside of the CCMPA. Comparable statements were given by fishers in Chachahuate, blaming the HCRF for 'not communicating with us about policies and regulations' which cause individuals in this community to 'break the rules'. However, some fishers in Chachahuate admitted deliberate non-compliance because they do not agree with the restrictions:

> '*we don't have enough space to dive….we need to take lobster to make enough money to live….. it's a necessity and we have families to feed…we'll always break the rules when we're hungry'* (Chachahuate Fisher interview, 15/07/10).

5.4.5. Role of external influences

The earthquake and political coup in 2009 affected the ACM process because of underlying problems with the management system. First, an earthquake of magnitude 5.6 hit the country in May 2009 with the epicentre located 30 kilometres north-west of Roatan in the Bay Islands. Widespread panic among local citizens ensued as many aftershocks were felt for several weeks. Although the earthquake caused minimal damage to infrastructure, it created substantial economic damage as the tourism industry was severely affected. Ecotourism has been the main focus of community development in all three case study sites in coordination with the national economic strategy for development focused on the tourism potential of the northern coast (World Bank, 2006). As a result of the earthquake, the tourism projects developed in the Garifuna communities as alternative income streams have not reached their maximum potential.

Second, a macro-level political crisis influenced the functioning of all levels of governance within the CCMPA structure. On 28th June 2009, President Zelaya was removed from office by military force acting on orders from the Supreme Court over his plans to hold a referendum to change the Constitution to enable a political party to remain in office for two terms. This removal was condemned internationally as a military coup and the interim government was not recognised by the international community. Subsequently most

international donor organisations operating projects in Honduras withdrew their funding and staff, and international trading was temporarily ceased. Civil liberties were withdrawn by the interim President in an attempt to control the widespread protesting in support of President Zelaya by military enforcement of a nationwide curfew. Funding received by the state from major international organisations including the World Bank, US AID and the US Peace Corps in support of national economic development targets was withdrawn immediately. This de-stabilised the macro-economy and created negative growth for 2009-10 (World Bank, 2010) which damaged all sub-level economies. These donor organisations not only funded state-level activities, but also infrastructure improvements at municipal level. In the Department of Colon, US AID had pledged to fund the majority of the costs to construct a new road transport route to connect Trujillo to La Ceiba in the Department of Atlántida. This road network would have included a bridge to link Rio Esteban with the main highway, providing a vital access route during the monsoon season. Since the coup, this project has been suspended pending the re-instatement of US AID operations in the country. By July 2010, US AID had still not resumed any operations. The departmental government agencies involved in the governance structure of the CCMPA have also seen a reduced level of state funding for their operations, hindering the communication between multi-level stakeholders.

The coup also affected the financial stability of the HCRF which was undermined by the withdrawal of the production company filming the reality show; the ending of funding through donor organisations; and reduced tourism numbers. Despite the substantial income generated by the previous reality shows, by 2009 the HCRF was in a 'financial crisis' (HCRF KI interview, 14/06/09). This crisis has hampered the managerial ability of the HCRF because efforts have been focused on securing its own financial future, and communications between the HCRF, governmental agencies and the local communities have deteriorated. Without the HCRF steering the mechanisms for feedback and review of current social-ecological information, the ACM process cannot function effectively.

At the micro-scale, the ramifications of the coup have also affected the HCRF's participation in the management process for the CCMPA. The need to generate individual household income became a priority for the representatives over collective interest in the conservation of the CCMPA, and income dependency on traditional activities has increased since alternative income options have become less viable, as discussed in chapter 3. In the face of increasing difficulty to generate household income through either traditional or non-traditional streams, cooperation with management regulations and conservation objectives is

limited. Only when both environmental and economic imperatives are aligned can the management process function effectively to include user group participation. However, it is even more important during times of crisis to work efficiently together to generate data to ascertain the level of dependency on marine resources and subsequent ecological impacts through catch assessments. This is even more crucial for the CCMPA having implemented a socially-driven management plan that opened more fishing grounds to the Garifuna. The coup has also limited the number of Garifuna entering the USA because visa applications were stopped during the interim Presidency. This has caused two effects: 1) the youth are remaining in their community, which strengthens the social and cultural capital available in each community, but conversely 2), the youth are perceived by community leaders to be damaging the social capital of the communities because lack of available job opportunities has resulted in an increased involvement with narcotics trafficking to earn money (not an opinion expressed in Chachahuate).

Independently of the external events in 2009 discussed above, the second management plan implemented in 2008 (after substantial participatory revision) had weak (or missing) governance conditions identified by Armitage et al (2008) for successful ACM.

1. There has been insufficient social learning by all stakeholders to generate a shared understanding of the natural resource management issues. Without this shared understanding, external political and economic influences have been able to dissolve collective action in favour of individual economic incentives.

2. The property rights afforded to different sectors over the islands and cays of the CCMPA have created both bridges and fractures in relationships between the communities and the HCRF. The community of Chachahuate developed a more productive relationship with the HCRF as they were donated the title deeds for the cay. However, since receiving the deeds in 2007, interest in participating with the HCRF in the management process has waned, and non-compliance with fishing restrictions remains at the highest level of all three communities. By contrast, the support from the HCRF over the title deeds for East End has improved relations with Rio Esteban as the sister community and fisher compliance with the management regulations is greater than the other communities.

3. Stakeholders at all levels have not committed to the long-term nature of the process. Since the HCRF did not implement capacity training to enable all stakeholders to

conceptualise the social-ecological system through a shared understanding, stakeholders at different levels perceive different time-scales after which they would expect to experience positive outcomes from the management process. Local user groups operating within a short-term economy on average expect to see income and ecological improvements within 6 months to one year (Key informant investment audit, Rio Esteban and Nueva Armenia, 2010). By comparison, government agencies and NGOs operating at meso and macro-scales have a more long-term understanding of natural resource management, following twenty year national objectives for environmental sustainability and development. These differences in the magnitudes of scale that stakeholder conceptualise the social-ecological system affects their commitment at each scale of governance to participate in the management process. However, institutional commitment and progress to the ACM process can be harmed more seriously by the macro and micro-scale political instability that underlies all social and institutional learning.

4. The HCRF have not provided sufficient capacity training to develop a shared understanding of the social-ecological system through multi-level knowledge and information. This meant the process lacked the openness necessary for the plurality of knowledge to be exchanged, placing the same emphasis on both expert and non-expert knowledge. Without such frame of knowledge, power within the management process has not been equitably distributed, leading to lack of trust between stakeholder groups. Without this shared capacity for understanding both expert and non-expert knowledge, double-loop learning has not occurred at all levels to change the values and subsequent behaviours of all stakeholders. Meso-scale government agencies and environmental NGOs have achieved double-loop learning through regular meetings with local user groups, generating an understanding of micro-scale conceptualisation of the social-ecological system. But, the communities have not yet benefitted from the same learning because technical education and capacity building has only become a priority for conservation and community development in the second phase of management. This imbalance of social learning remains in favour of the management elites.

5. The management process depends on key leaders and individuals to provide momentum and channels of communication. The HCRF became dependent on the TNC for both regional and national policy direction of conservation and community

development objectives. In 2009, the TNC-MAR Programme was prematurely ended because the organisation could not fund the initiative in the wake of the global economic crisis in 2008[6]. As a result, regional coordination across the Mesoamerican Barrier Reef System (MBRS) was devolved to national representatives, and the TNC severely scaled back its involvement with the CCMPA. Since 2009, coordinated efforts between the two organisations have focused solely on spawning aggregation sites.

However, there have been some positive changes to the governance framework that have enabled certain conditions to be met:

1. Supportive national policy is beginning to develop as regional strategies arise as a coordinated response to national environmental and developmental policy goals. SERNA have maintained strong links with the Garifuna communities to provide environmental education of ecosystem conservation. This objective enables the organisation to maintain communication with the HCRF on a project basis.

2. Changes to the regulatory mechanisms in favour of more collaborative and socially-oriented benefits have improved support for the conservation objectives of the CCMPA.

5.5. Conclusion

The first phase of management for the CCMPA did not provide the necessary governance conditions to enable adaptive co-management, or generate the trust, linkages or social learning to allow adaptive co-management to function in the future. Inequalities of power between stakeholders involved in the governance arrangement prevented effective participation in the management process to enable social learning and conflict resolution. However, collective action by the local user groups against external events generated sufficient political power to influence the management process. Whilst this externally derived power was able to drive the management revision process towards social development in the short-term, it failed to improve long-term governance conditions.

[6] The TNC is funded entirely by donations as a non-profit organisation.

In the case study presented, the local user communities are 'coping actors' as coined by Fabricius et al (2007) because they display capacities to adapt to changes in the social-ecological system (via alternatives) but do not have the capacity to manage the systems directly. However, as detailed in this chapter, they lack the capacity for governing the resources of the CCMPA because they lack effective leadership, vision and importantly the motivation/willingness to change their values for the long-term sustainability of both environmental and social conditions. Despite some good examples where key individuals are aware of threats to the long-term sustainability of resources, the communities have not taken appropriate action, relying on external agents to provide solutions for them. So, these micro-level stakeholders have only achieved single-loop learning. Moreover, without the capacity training to participate in a technical discourse, they were unable to understand management solutions in the same scale as other meso-scale stakeholders.

In the second management cycle, the power structure within the governance framework did not change even though the communities had successfully influenced the revision process. Yet, the power held by the HCRF has diminished as its network of regional and international linkages has contracted. What is evident from the networks and linkages cultivated by the HCRF is a preference towards organisations/individuals able to provide either a financial service or political stability. It is also evident that personal relationships have exerted the greatest influence on maintaining these networks. Those linkages that have been dissolved or weakened were often the main sources of financial and operational support to the HCRF, and without this support the ability of the HCRF to assist the ACM process has withered. In its place, power has been transferred to regional government agencies which have been provided with greater resources to promote national policy initiatives for conservation and sustainable development. So, the power of the state has increased through its devolved agencies.

These initiatives involve the whole community through capacity building and sustainability planning, promoting inclusive participation in natural resource management. This greater participation through state agency mechanisms is paving the way for ACM to occur in the third management cycle of the CCMPA. A hierarchical governance agenda to monitor NGO performance monitoring has been devolved to regional agencies, giving the State mechanisms through which trust-building, vertical and horizontal linkages, and social learning can occur. The role of NGOs will not be reduced in terms of responsibilities for managing protected areas in Honduras, but their effectiveness will be reviewed and assessed in a more equitable fashion involving stakeholders at all levels of the governance structure.

CHAPTER 6: DISCUSSION

This thesis set out to look at whether a co-management arrangement or an adaptive co-management arrangement, or both, were able to achieve their stated objectives for conservation and socio-economic development in the CCMPA. In addition, it critically examined the governance framework within which management arrangements were implemented, to determine if the necessary conditions for effective ACM were generated during the first CM management cycle. This examination of the process of changing from a CM to an ACM arrangement, through a governance lens, provides an original contribution to understanding the specific conditions under which ACM is most likely to proceed, and generates a novel contribution to the growing literature on the theory of adaptive co-management through the perspective of the decentralisation of natural resource management in Honduras.

It was found that both CM and ACM could achieve their stated objectives in the CCMPA to some degree, but the critical components of social and institutional learning, shared understanding of the resources, equitable access to knowledge, and inclusive participation were often weak or absent. The CM arrangement suffered from feeble participatory governance, creating a climate of mistrust with local level stakeholders, and perpetuated socio-economic stratification within communities. The management review process, used to implement the ACM arrangement, was dominated by socio-political conflicts which re-regulated the rules of management and participation in favour of the local user groups. While this process improved the visibility and influence of local stakeholders within the decision-making framework (improving the CM function), it did not achieve a balanced understanding of the resource problems or generate a shared management perspective to allow adaptation through learning (the ACM function). Without this shared understanding, localised support for the management regulations, compliance with those regulations, and the long-term sustainable benefits to be derived from the regulations, were all undermined.

This thesis has found that in addition to the necessary conditions for ACM described by Armitage et al (2008) (Table 1.3), other factors are also important in the specific situation of the CCMPA: a high level of community dependency on natural resources for income, strong traditional community rules and norms, high levels of social capital and community cohesion,

and continuous interactions with external agents to facilitate and foster local-level capacity. Furthermore, unforeseen secondary factors at the macro-level have affected the success of ACM in this case study including natural events (earthquakes); political and economic stability; poorly administered decentralisation of natural resource management; and perceptions of financial corruption permeating to all scales of governance. In addition, uniquely to this case study, the impact of the filming of a Reality Show inside the CCMPA (linked to perceptions of financial corruption) provided the main catalyst for management changes through grassroots protest action.

The nature-society and governance interactions of three local Garifuna communities were examined to review the effects that CM and ACM have had on these interactions. I have attempted to examine how the way in which natural resources (fisheries) are perceived by different level stakeholders has a very important effect on the way in which they are used and managed. I have shown that perceptions of natural resources have remained distinct between institutions and at different scales within the governance framework because of weak social and institutional learning. Through this governance lens it has been possible to identify strengths and weaknesses in both CM and ACM models that have both enabled and opposed the progression of decentralised natural resource management in the CCMPA. So this thesis offers a multidimensional analysis of the governance complexities within the CCMPA and outlines possible resolutions.

In this chapter I shall summarise the key findings from the last three chapters (3, 4 and 5) in light of the research questions posed at the start of this thesis. The main arguments from each chapter will then be brought together to review the effectiveness of co-management arrangements in managing the natural resources of the CCMPA. These arguments will be combined with a review of the presence/existence of the enabling governance conditions that affect the functioning of co-management arrangements to answer the final research question - has CM and/or ACM been an effective management model for the CCMPA, or would a different model be a more appropriate management regime for the locally specific conditions of this case study? This will focus on a review of the successes and failures of the first management cycle, the pre-conditions created for ACM, and the successes and failures of the second management cycle. I will then review the

implications of each management arrangement for the wider sustainable development of the three Garifuna case study communities.

6.1. Has the sustainability of natural resources been enhanced by co-management and/or adaptive co-management?

6.1.1. Six of one, half a dozen of the other….

The preservationist regulations introduced by the HCRF to conserve ecosystem and fishery resources have achieved some positive outcomes for shellfish species yet conversely caused subsequent negative outcomes for some target finfish species. After two management cycles, there is biological evidence (annual data collected by Opwall and Reef Check) to show that the view that the conservation objectives are producing species-specific positive outcomes. The abundance of spiny lobster which have increased under temporal and gear regulations, can be linked to (but not directly related to) the CM arrangement. Although these regulations had initial adverse effects on the income of fishers (2006; 2007) and suffered from a biological time-lag effect for population recovery, during the second management cycle fishers were able to collectively acknowledge some species recovery (2009; 2010). Fishers in all three communities agreed that shellfish populations have increased since the introduction of the first management plan in 2004, and they attribute this directly to the management. However, extraction of finfish species was not under equally strict regulations, and community effort from shellfish specialists (divers) was re-directed into the finfish fishery. As a result, the inferential evidence generated by this thesis presented in Chapter 3 indicates that three of the most frequently caught target species are considered overfished (yellowtail snapper, kingfish and bonefish), with another species in danger of being overexploited (grunts) under current effort levels. In addition, the catch-per0unit-effort (CPUE) of all fishers has decreased as well as the average size of species landed. Thus while species-specific conservation efforts are achieving success, neither the CM or ACM arrangements have generated ecosystem-wide conservation.

While artisanal fishing pressure on the north coast of Honduras is comparable to other tropical coastal fisheries, empirical evidence generated in this thesis suggests that the amount of catch derived from inside the CCMPA has decreased as a result of the fishing regulations. It is arguable that these lower catch rates inside the CCMPA have not been an outcome of either

management model because fishers who have reduced their income dependency on the CCMPA's natural resources have done so as a result of socio-economic pressures rather than because of ecosystem understanding and support for conservation-based management. Instead, this outcome has been caused by State-enforced regulations as one of the suite of management tools used by the HCRF to conserve fish stocks, but crucially not as a result of CM which would aim to generate community understanding of the resource problem and subsequent regulatory compliance. This lack of ecosystem understanding has contributed to a secondary impact of poorly administered co-management - overfishing of brood stocks outside the CCMPA boundaries that lower/inhibit target species recovery inside the protected area. Whilst this may not be attributed solely to the effort from the three communities that are the focus of this study, the consequences are experienced by those fishers.

Although there is an undeniable relationship between the introduction of fishing regulations and ecological recovery of shellfish species in the CCMPA, it is impossible to make a linear assumption/connection that the specific use of either the CM or ACM model has been the causal agent. Before the first management plan was introduced, a moratorium was placed on all extractive activities giving the CCMPA several years without fishing pressure to promote species recovery, and enforcing input controls to regulate fishing effort in a fishery that previously had no State or community regulation. Yet continuing non-compliance by local community users has been a problem under both management models, and State-centred enforcement for the prohibition of commercial fishing has been the most successful outcome since resource privatisation.

6.1.2. Protecting or exposing natural resources through decentralisation?

Decentralisation of natural resource management in Honduras created a multitude of protected areas that function to conserve biologically diverse ecosystems. In this case study, the privatisation of the CCMPA to conserve the ecosystem has achieved protection from the threat of commercial fishing because the State sponsored enforcement with regulations. Without the Navy patrol, the HCRF and DIGEPESCA would have been ill-equipped to prevent commercial trawling inside the CCMPA because of limited financial and personnel resources. The CCMPA is the only protected area in Honduras to benefit from such enforcement, but this generated the

question of whether protection from small-scale local fishing had been achieved, and would it have been achieved without this enforcement? The lack of local stakeholder participation in the first management plan created a cycle of non-compliance with regulations and unregulated extraction of marine resources by individual fishers in all three communities. This situation did not improve in the second management phase because those fishers remained outside the management process. Without the enforcement provided by the State, would the fundamental principles of co-management – trust-building, shared understanding and environmental education – have been implemented to a greater or lesser degree along with community-based enforcement to promote community compliance with the regulations? If this is true, State maintained enforcement and underperformance of the principles of good governance have undermined the conservation aims of management.

6.1.3. Ecologically conscious or unconscious stakeholders?

The ecological consciousness of different stakeholders within the governance framework of the CCMPA reflects their different levels of ecological knowledge and understanding – micro-scale experience based knowledge, meso-scale evidence based knowledge and macro-scale politics based experience. The most ecologically 'conscious' stakeholders have been the meso-scale institutions (HCRF, WWF, TNC, SERNA, DIGEPESCA, ICF) because of their access to locally specific knowledge, technical knowledge and regional networks of environmental partners. In the CM arrangement, micro-scale stakeholders (local communities) were only allowed to participate in the decision-making process through consultation. Their local ecological knowledge (LEK) of the causes and effects generated from both within (natural) and external (policy) to the social-ecological system was disregarded because of the dominance of technocratic organisations and associated expert knowledge. Environmental awareness and understanding at the micro-scale was not expanded during the management plan revisions or subsequent ACM arrangement because socio-economic conditions dominated decision-making. As a result, ecological considerations were demoted to reduce the tension between the HCRF and local communities, and ecological discussions remained in the scientific domain. The community representatives achieved their socio-economic agenda, and the HCRF mitigated the conflict arising from poor participation in the CM arrangement. Consequently, the strength of socio-

economic considerations for local communities and conflict resolution mechanisms overshadowed ecosystem-based understanding in the ACM regime.

The information coming from the local communities suffered from inaccuracies. As a community representative, their level of local knowledge of the marine environment should be correlated with a high level of resource use (fishing), so fishers with the highest CPUE inside the CCMPA should fulfil these roles. However, the community representatives in the CCMPA case study had use of motorised vessels to reach more distant (and productive) fishing grounds, and only a small portion of their collective CPUE was focused inside the CCMPA. Additionally, these cooperative members reduced their overall CPUE in favour of tourism alternatives, becoming non-dependent on fishing for income, but maintained their representative role with the HCRF. In contrast, individual fishers with canoes with sails were limited to less distant fishing grounds within the CCMPA, so collectively produced the highest CPUE in the protected area. Therefore it was reasonable to assume that the current knowledge of the representatives about the status of stocks and ecosystem health inside the protected area was less accurate than that of the individual fishers. Consequently, the 'community' information fed into the management system through representative consultation did not accurately represent the reality of existing conditions. This fuelled non-compliance by individual fishers as conservation regulations perpetuated socio-economic decline.

6.2. Socio-economics: has the sustainability of local community livelihoods been enhanced by co-management and/or adaptive co-management?

6.2.1. Fisheries resources at the centre of local livelihood strategies?

The extraction of fishery resources was historically the main source of income for Garifuna households. Yet the most important economic conclusion to be drawn from this study is that households now derive income from multiple sources, and households in Chachahuate (inside the CCMPA) were significantly more dependent on fishing than households in Nueva Armenia and Rio Esteban (coastal communities) which can supplement their income with other activities. Both coastal communities have become significantly less dependent on fishing for income since 2006, rising from just less than half of households sampled (Nueva Armenia, 44%; Rio Esteban, 50%) to around 4 out of 5 of households in 2009 (Nueva Armenia, 21%; Rio Esteban, 24%). Yet

all communities are increasingly reliant on tourism as part of livelihood options. But these livelihood strategies put households at risk of external forces that impact the allocation of resources to households. For example, decreases in the market value of fish products makes highly dependent households more reliant on alternative income sources, often tourism, while volatility in tourism numbers (natural disasters, military coup) makes households more reliant on the income generated from traditional activities, such as fishing. While the number of households primarily dependent on fishing for income has decreased, it remains an important 'safeguard' against unpredictable changes to other livelihood options.

It is this very function as a safeguard that has the potential to undermine a co-management regime that does not include the whole community in the future. Evidence in this thesis suggests that the youth generation (mainly males) in the two coastal communities are claiming their fishing entitlement within the CCMPA as a mechanism to make 'fast cash' during times of disturbance to their other livelihood options, such as, construction, tourism. At these times individuals will turn to fishing to make up the household income deficit, putting extra pressure on the resources in the CCMPA and surrounding areas, and often landing species indiscriminately for sale and subsistence food. So fishing (and other traditional livelihoods) is expected to take up the surplus labour and generate the necessary extra income. This short-term but intensive level of fishing has the potential to become more frequent as the consequences of macro-level political (coup) and economic instability (recession) are beginning to be felt in the communities, with fewer jobs available and less money for education. Not only does this put greater pressure on fishery resources, it also makes fishing dependent households vulnerable - which threatens the poverty alleviation and food security functions of the CCMPA. Furthermore, these intensive periods of fishing are also changing interactions with nature and its cultural and social heritage within the community as a short-term income 'quick-fix' rather than long-term livelihood. Perhaps most importantly, this extra effort within the small-scale fishery has fallen outside the sphere of both management regimes because these individuals were not registered as fishers within the community, and to date there has been no community-wide education of ecosystem health and services. Compounding this educational problem, these target individuals also often reside outside the household/community while working in alternative livelihood options, meaning that local environmental education could never be delivered first-hand.

6.2.2. Remittance dependency – the demise of local livelihoods?

There has been a culture of dependency emerging in poor and marginalised coastal communities on remittances generated by family members outside the community. While remittances have assisted in increasing the overall wealth of households and communities, they have created some socio-cultural tensions in each community. People in households who receive remittances lack a willingness to engage in community-based livelihood activities, and traditional knowledge of fishing and farming practices is being lost. Similarly, these households are changing the culture in the community, introducing fencing around households to territorialise land. This has detracted from the social cohesiveness of the community through deliberate separation from neighbouring households. In spite of these socio-cultural issues, remittance dependency does not necessarily signal the loss of community cohesion and social capital. Money derived from outside the community has often been used to fund communal resources including medical facilities, water supplies and improving infrastructure, and to fund new businesses within the communities (hardware stores). Although these are not traditional livelihood options, they are re-invigorating the economy of communities in the face of decreasing natural resources, and therefore have the potential to buffer households dependent on those resources from losses of income during periods of hardship. However, remittances are not immune to external macro-economic pressures, and have suffered significant reductions since 2008 as a result of the global recession. Should remittance contributions to the household income continue to decrease, traditional local livelihoods may resume an important role to take up the shortfall.

6.2.3. Neoliberal reforms and ecotourism development as an alternative livelihood

Taken as a whole, the three communities studied in this thesis are becoming increasingly reliant on eco-tourism based alternative livelihoods for household income. The small size and social capital available in Chachahuate has enabled almost all households to benefit from ecotourism, and this community has also received the greatest level of external funding for the infrastructure of these developments. In contrast, on closer inspection of the two coastal communities, the beneficiaries of ecotourism are primarily those individuals connected with the HCRF or community leaders/elites. These individuals have the social networks and linkages to gain the knowledge of alternative opportunities which has intensified the socio-economic stratification

within the community. These two communities have not achieved the same success from ecotourism alternatives as Chachahuate because of insufficient marketing and poor infrastructure. However, these are not the fundamental problems preventing the success of ecotourism. Neoliberal reforms have re-regulated land for tourism development along the north coast, and this has undermined Garifuna entitlement to traditional land. Such reforms expect local markets to take advantage of development opportunities when often local communities do not have the capital for investment or the technical capacity to develop ecotourism alternatives without external assistance. While this external assistance may promote community-ownership and management, in these case study communities it has inadvertently generated dependency on external agents for decision-making and managerial responsibilities. In both Nueva Armenia and Rio Esteban, ecotourism-based activities have been implemented in the recent past but have not succeeded because of weak social capital and trust, and limited capacity to manage and maintain community-based projects. So, ecotourism developments to enable local communities to exploit the opportunities created through neoliberal reforms have been limited by technical capacity available at the local-level.

6.2.4. Re-framing of management

The lack of consultation and participation by local communities in the decision-making process in the first co-management plan caused considerable socio-economic consequences for many fishing households, which were not immediately alleviated by the provision of alternative (and suitable) livelihoods. Having implemented strict regulations on fishing activities, it was a secondary objective of the management plan to 'diagnose the main economic activities of the area and to develop mechanisms to incorporate local populations with profitable developments' (CCMPA management plan 2004-2008). Financial hardship coupled with the perception of corruption from the filming of the Reality Show instigated a bottom-up protest to gain more equitable access to decision-making in the subsequent adaptive co-management plan. The intensity of the political pressure on the process to accommodate societal needs diminished the position of scientific hegemony and created more socio-economically appropriate policies. In fact it became a socio-economic objective in the second management plan to 'open zoning for the practice of artisanal fishing' (CCMPA management plan 2008-2013). Specific targets to

benefit the local communities were devised to create (as opposed to propose) opportunities for socio-economic development that would harmonise with the local culture. Such objectives indicated the acceptance that continuation of traditional activities and culturally-acceptable alternatives only would be tolerated by the local communities. Although this did reduce the dominance of ecology and preservationist policy-making, it demonstrated an adaptive capacity to respond to the locally specific conditions experienced by the communities. However, importantly for this thesis, the management process did not demonstrate social or institutional learning to challenge the assumptions held by any stakeholders. The HCRF responded to political pressure to alleviate the conflict with local communities but it did not seek to understand the cultural importance of traditional activities. Similarly, local fishers and communities changed the rules of their participation in the decision-making process, but did not seek to understand the ecosystem-level conservation goals of the HCRF.

6.2.5. Decentralisation - financial independence or financial burden?

Decentralisation of natural resource management in Honduras relieved the State of the financial burden of managing its considerable natural assets, but passed on this burden to NGOs without providing any financial assistance. Without any financial assistance from the State but with obligations of full responsibility for the CCMPA, the HCRF has had to seek monetary assistance from external sources. Co-management of resources through decentralisation should share this financial burden with the co-management partners – in this case the Municipality of Roatan. However, the HCRF only received legislative support from the Municipality making it obliged to fund management activities alone. Thus, in the first management plan one of the economic goals was to propose a financing strategy to ensure sustainability of the area, while in reality this strategy meant finding the financial support to ensure sustainability of the HCRF, which became its primary concern.

Some of the finances raised by the HCRF since 2004 have been the result of a happy partnership between conservation and tourism (Opwall), but in 2007 substantial mid-term revenue was raised through a controversial arrangement to permit the filming of a reality show within the CCMPA. While this arrangement created temporary financial independence for the HCRF to implement conservation and development projects of its own volition, it also instigated a social and political

backlash that was to shape the future of management in the CCMPA. In the eyes of the local communities, the income generated by the reality show was perceived to be for the personal gain by staff in the HCRF at the expense of community development. So the financial independence gained by the HCRF created further socio-political burdens for management.

6.2.6. Economically conscious or unconscious?

Income and expenditures for management have undoubtedly been the main drivers of the governance system in the CCMPA, being the dominant imperative at all scales in the management process. Thus, stakeholders at all levels are economically conscious. Decentralisation of natural resource management was a response to the need for economic efficiency by the State, the HCRF formed partnerships with donor organisations outside of the governance framework to provide financial sustainability, and local livelihoods based on natural resources have driven the participation of local fishers in management, and catalysed the politicisation of natural resource management in the CCMPA. While ecological consciousness was bound to the understanding and knowledge acquired by different level stakeholders, economic understanding of the impacts of management at the local level has transcended these boundaries. Stakeholders at all levels are politically, but not economically, aware of the difficulties experienced by local communities because of the political action taken by the Garifuna to change the management regulations. But, they do not understand the economic difficulties of the State and devolved environmental agencies (including the HCRF). The adaptive co-management plan has not asked local communities to contribute to the costs of managing the resources, and this financial burden remains the sole responsibility of the HCRF. Yet the financial costs and profits of the HCRF have never been made publically available, fuelling the speculation at community-level that the organisation is financially corrupt. Without full transparency of its financial transactions, the HCRF does not comply with the enabling conditions for successful CM/ACM and limits its trustworthiness for other stakeholders.

6.3. Governance: has the flexibility and adaptive capacity of governance been enhanced by co-management and/or adaptive co-management?

The criticisms of CM arrangements for small-scale natural resource management made by Pinkerton (1989) can still be seen in the management of the CCMPA. The devolution of

regulatory functions to local agencies to relieve the State of unmanageable costs (economic efficiency) have resulted in a lack of accountability of the HCRF because devolved government agencies have not had the resources to monitor and evaluate its activities. Local resource users have suffered loss of power over their livelihood decisions by limited inclusion in the decision-making processes concerning fishing activities. Although community representatives have been appointed, their participation exacerbated socio-economic inequalities in the coastal communities because it created a stratification of knowledge and power at the local level. What is important to note is the impact of these deficiencies of the HCRF, especially during the ten year period (from 1993 to 2004) taken by the HCRF to initiate the first CM management plan. When rapid expansion of protected areas produced a rapid expansion of the scale of responsibilities placed on devolved government agencies. Like the HCRF, these agencies received inadequate resources from the State to function effectively, and were simply unable to regulate NGO management or ensure adequate participation by local users. CM arrangements and effective feedback mechanisms for providing socio-ecological regulation were absent.

6.3.1. Managing natural resources through decentralisation – policy coordination or isolation?

Decentralisation of natural resource management in Honduras created further problems for the control of governance to regionally devolved government agencies as well as NGOs. Devolved management was designed to meet the needs of locally specific conditions, and promote greater freedoms and flexibility for State institutions to manage resources more effectively. While theoretically sound, the practicality of decentralised responsibilities has been fraught with complications because Departments in Honduras (counties) range in size, wealth and population, but devolved resources for natural resource management do not reflect these differences. Each Department has different priorities for both economic development and natural resources which reflect the specific conditions within its geo-political boundaries, and overarching national strategic aims for conservation and fisheries were disjointed and sector specific. As a consequence, decentralisation has simply encouraged locally-specific policy development, and actually reduced the communication and coordination between government agencies and neighbouring Departments. Additionally, the State regulated commercial fishing along the north

coast which produces significant export revenue for Honduras juxtaposes the decentralised administration of the CCMPA, making it operate as an isolated protected area with conservation policies that are at odds with the economically-oriented regulation of commercial fishing.

Furthermore, decentralisation has been particularly problematic for the CCMPA because its area of influence extends into three Departmental boundaries, but the co-management arrangement is only with the Municipality of Roatan (the geo-political location of the CCMPA). Mass-tourism development priorities of the Municipality of Roatan have clashed with the conservation and eco-tourism priorities of the CCMPA, which has hindered coordination of environmental and sustainable development policies, compounding this tension. All environmental monitoring and regulation is the responsibility of the relevant government agencies in the Municipality of Atlántida, because of the CCMPA's geo-ecological position in coastal waters. But, coordination between these agencies has been weak because of the large scale of administration responsibilities with limited resources. So whilst decentralisation promoted an ecosystem-based approach to natural resource management, administration responsibilities remained compartmentalised as a result of inadequate funding and State-level strategic planning.

6.3.2. Participation – representation or inclusive participation?

In CM arrangements the participation of local-level stakeholders is usually via representatives with strong connections with the resource in question, and strong traditions of community rules and norms frame that representation. Yet in the CCMPA, representatives do not naturally exist, and have been artificially created by the formation of fishing cooperatives and groups to permit community access to external funds to improve fishing efficiency. This thesis has shown that in specific cases, these representatives have been ineffective and have not served the collective needs and opinions of all fishers in the community. The outcome of such mis-representation has been quite profound, creating a stratification of power and wealth within communities and between communities. Whilst the HCRF has always communicated with these representatives and followed formal channels within the communities (Patronato), they recognised that this has not achieved effective local-level participation.

Even with representatives, local-level participation in the decision-making process was also restricted by the hegemonic dominance of technical discourses around ecology and development

maintaining power within the macro and meso-scale institutions. For example, the terms 'ecotourism' and 'sustainable development', both of which have a scientific rationale and understanding by those within macro and meso-scales, prevail in discussions about the promotion of alternative livelihoods even though the local communities do not understand the meaning of such terms. Therefore measures that affected the local communities were discussed within a power discourse that reinforced top-down management within a co-management arrangement.

6.3.3. Dominant voices – changing the rules of management

Having initially implemented a preservationist approach to conserve and prevent further degradation of natural resources in the CCMPA, the co-management arrangement in 2004 only marginally included local-level stakeholders in the decision-making process. As stated above, positivist knowledge dominated the development of ecologically-centred policies, and little effort was made to reconceptualise resource understanding within an EBA framework for stakeholders at different scales. Without equal local community participation in the decision-making process, local socio-economic dependency on the resources within the CCMPA was largely ignored. The result was civil unrest, catalysed into socio-political protest action by the filming of the Reality Show in the CCMPA. The HCRF were forced to acknowledge the local impacts of the ecologically-driven first management plan. In order to redress the balance of stakeholder participation and local-level resource knowledge, the second management plan incorporated community economic development needs to a greater degree than ecological needs. The local community representatives were able to voice their discontent, and with the assistance of external agents, their message was transmitted to higher governance scales. Consequently the local-level stakeholders were able to increase their power and influence in the second ACM arrangement through expanded networks of interactions between other stakeholders in the governance framework.

6.4. The presence/existence of enabling governance conditions for co-management arrangements

Having reviewed the effectiveness of both management cycles in achieving sustainability of natural resources, sustainability of local community livelihoods and flexibility of the governance

arrangements, it is possible to identify the extent to which the necessary conditions identified by Armitage et al (2008) are present or absent in the CCMPA. These factors were examined by McConney *et al* (2003) as components for co-management in the Caribbean. When all factors are considered together, a broader set of inputs, processes and outcomes can be established to understand the requirements of implementing, and also maintaining, a CM/ACM devolved management arrangement in the CCMPA (Figure 6.1). In this set of components, outcomes can also be considered as the necessary inputs to maintain devolved management. Table 6.1 re-states these conditions and indicates the presence or absence of each condition with a yes/no column, and a summary analysis of the locally specific problems related to each condition have been added in red type.

Table 6.1: Presence/absence of the ten conditions for successful ACM (adapted from Armitage *et al*, 2008)

1	A well-defined resource system characterised by a relatively immobile resource stock which is less likely to generate institutional challenges or conflicts, while creating an enabling environment for learning. The CCMPA is clearly defined, but the lack of national level policy coordination for commercial fishing in surrounding waters has created conservation challenges. Ecosystem understanding of target species exists through partnerships with Opwall, WWF and TNC but this knowledge has not been used sufficiently or acquired by local-level stakeholders.	Yes
2	Small-scale resource use which reduces the number of competing interests, complexities and organisation. Privatisation of the CCMPA gave rights of access to select Garifuna communities, and prohibited commercial fishing inside the boundaries. This has reduced the number of competing interests for fisheries resource use. However, the small-scale resource use has a highly complex governance arrangement including three different Departments (counties), devolved government agencies, environmental organisations and local user groups.	Yes
3	Clear and identifiable social entities with shared interests that help to build trust and linkages. In situations without these connections, efforts by local and regional organisations to achieve better outcomes may be undermined by non-local economic and political forces. The lack of shared understanding of the social-ecological system and associated concerns for management has hindered the formation of trust and linkages between different governance scales, and unexpected political and economic events have reduced interest in the CCMPA as stakeholders prioitise their own interests.	No
4	Reasonably clear property rights to the resources in question which facilitates governance innovation and learning, associated with corresponding rights holder responsibilities. Property rights to the CCMPA resources are now reasonably clear in spite of disputes over entitlement to traditionally occupied territory inside the CCMPA. However, governance arrangements have been weak with the owners and Municipality of Roatan, and have limited the ability of all stakeholders to learn, reflect and adapt to changing conditions. Corresponding responsibilities for co-management have been in the form of legislative support by the co-managers, and enforcement supplied by the State. Yet the local communities, as access rights holders, have been given no responsibility for managing the resources which has undermined conservation objectives through non-compliance.	Some
5	Access to an adaptive range of economic, regulatory and collaborative management measures which apply diversity to achieve desired outcomes. The HCRF have had full access to a range of input and output regulatory measures, including the CM and ACM management arrangements as tools for governance.	Yes
6	Commitment to support a long-term institution-building process where stakeholders accept the long-term nature of the process. Commitments of this type can provide a degree of relative stability to counter numerous stresses from within and outside the system. The historical conflicts between the HCRF and the local communities have prevented a build-up of trust, shared understanding or commitment to the management process from the	No

	local users. The short-term nature of the local economies based on multiple and seasonal livelihood options is incongruent with the long-term investment required to manage the CCMPA for sustainability in the future. The mis-match of economic scale between the resource users and the resource necessitates ecosystem understanding to accept the long-term nature of the process. Additionally, the short-term national and local-level political cycles undermine the ability of institutions to maintain interaction with the ACM process.	
7	Provision of training, capacity building and resources for local, regional and national level stakeholders to enable development of the skills required in an adaptive co-management context. There has been insufficient training and capacity building at all scales to enable stakeholders to develop skills for ACM – reflexivity, social-ecological education.	No
8	Key leaders and individuals who can maintain focus and drive for collaboration, with the ability to create opportunities for reflection of feedback and learning. Ideally these individuals should have a long-term connection to a 'place' or resource or within policy bureaucracy, to act as conflict resolution personnel. Key individuals have driven participatory governance in the CCMPA from within communities, government agencies, the HCRF and external agencies, but local communities have displayed a dependency to rely on these individuals to maintain momentum for participation and to perform conflict resolution with management, and key leaders are emerging from within localised institutions to perform this function in the future.	Some
9	Participant openness for successful plurality of knowledge, both expert and non-expert, to identify problems, frame solutions and analyse the information. Substantial contributions to system understanding, trust building and learning can be made by both formal and informal knowledge. The management process has been open to non-expert knowledge because of socio-political pressures to allow local communities to have a greater influence in the decision-making process. However, problems and solutions have been compartmentalised to deal with conflict-specific conditions. Insufficient double-loop learning has occurred at all stakeholder levels to improve system understanding.	Some
10	Supportive national and regional policy for collaborative management efforts will enhance success of adaptive co-management processes. Consistent support across policy sectors will encourage clear objectives, provide resources and distribute power to local actors and user groups. Decentralisation of natural resource management produced regionally-devolved government agencies which lacked resources to perform their regulatory functions. National level policies have been uncoordinated, isolating protected areas through specific conservation policies without the support of regional and national regulation. The normative principles of 'good governance' through decentralised co-management arrangement have been poorly implemented in practice.	Some

Three of the required conditions are not present in the CCMPA – clear and identifiable social entities [3], long-term commitment to the management process [6], and provision of capacity training [7] – which illustrate the insufficiencies of the first management plan under a CM arrangement. The historical conflicts between the HCRF and local communities created a need for trust-building and participation with the local user groups to generate understanding and support for management. However, through weak decentralisation processes the CM arrangement was administered as a State-NGO partnership, and only provided a tertiary consultative role for the local communities. Therefore the CM arrangement did not build up the social trust necessary to facilitate successful ACM. Deprived of this trust, social and institutional learning and associated feedback mechanisms have been confined within the limits of each governance scale. The governing system also lacked a collective willingness to generate shared understanding of the social-ecological system at all levels to challenge the assumptions held by different stakeholders. So double-loop learning, requiring a high degree of stakeholder participation (Diduck *et al*, 2005) has not occurred to change institutional behaviours.

Four of the other seven conditions of ACM have been identified as present to some degree in the CCMPA case study: clear property right [4]; key leaders [8]; plurality of knowledge [9]; and supportive policy sectors [10]. The property rights to the CCMPA have been disputed between the different private owners of the islands, adding territorial conflicts to the governance melee. However, in spite of such disputes, the rights of access for the communities within the sphere of influence have always been clear. Exercise of those rights has been dominated by the three communities studied in this thesis, while the other two communities within the sphere of influence of the CCMPA (Sambo Creek and Corozal) have replaced natural resource extraction dependency with tourism-based alternatives and other professions. The presence of key leaders and individuals to drive forward participation and social/institutional learning has been critical to provide representation of all stakeholders within the ACM regime. Some of these individuals have possessed skills of reflection and adaptation, as well as effective communication to others within their group. Yet, other individuals have indulged in rational choice advantages instead of working for the collective good of their group and the ACM process. Moreover, where individuals have been instrumental in active participation, their presence in the governance arrangement has been a double-edged sword: they have been able to represent institutional

opinion and transfer bidirectional knowledge, but the participatory process has become overly dependent on these few individuals to maintain focus and drive. Therefore the governance framework may be undermined/derailed should a key player exit the process. Poor evaluation of available ecological and LEK throughout the tenure of each management cycle, to perform an iterative system of monitoring and evaluation of policy treatments, has meant that different types of knowledge have not been merged and reviewed. Without merging all available information, interactions between meso-scale organisation and the local communities remained dominated by scientific discourse, degrading the value of non-expert knowledge for practical application of learning and adaptation of policies. The available LEK was only reviewed during the management review process as a conflict-avoidance measure to alleviate socio-political pressures. However, scientific hegemony has diminished in favour of greater inclusion of local-level knowledge, expanding the plurality of knowledge in the CCMPA.

The decentralisation of natural resource management by the State has been the most critical factor in the effectiveness of CM and ACM in the CCMPA [10]. As identified in the first chapter, the attribute of subsidiarity is the key to good governance because it shortens the divide between decision-making and civil society by sharing responsibilities. However, inadequate funding and resources needed to administrate subsidiarity through co-management arrangements have effectively widened this divide in the CCMPA case study. Power-sharing as a co-arrangement was ineffective because it excluded local users from the decision-making arena, maintaining all power between the State/municipality and the HCRF. The government agencies responsible for overseeing all State-NGO partnerships did not have the physical capacity to monitor and audit the activities of the HCRF. So from the implementation of decentralisation in 1992, equitable power-sharing, trust, linkages, networks, shared understanding and access to knowledge have all been weak between stakeholders in the CCMPA.

Finally, three of the conditions for ACM have been fully met by the CCMPA – a well-defined resource system with exclusive access for select local user communities [1]; small-scale resource use comprising of reef fisheries by small-scale fishers [2]; and adaptive range of resources including gear restrictions, closed areas and no-take zone combined with adaptive policy measures for community development [5].

The principles of good governance are considered as inputs to the management system, while shared values and adaptive capacity are considered as outcomes. However, as illustrated in Figure 6.1, there are many factors influencing the process of a devolved participatory management arrangement which reflect the locally specific conditions available. All of these

Core components for ACM	Factors affecting actualization of ACM	Desired outcomes for participatory governance
Participation Empowerment Shared decision-making Knowledge Learning Vision	Scale Power Multi-levels Land rights Representation Participatory mechanisms Monitoring and evaluation Organisational interests Local political stability National political stability Local social stability Local social capital Financial stability and resources Cultural norms and values Construction of knowledge External agents Leadership	Shared values Shared understanding of resource problems Social and institutional adaptation Policy adaptation
Trust building Interaction Accountability		Legitimacy of ACM process
Network building – horizontal and vertical linkages Communication		Consistent support across scales Clear objectives Coordination

Figure 6.1: Core components/inputs, processes and outcomes for devolved management in the CCMPA. (Adapted from McConney et al, 2003).

factors have helped or hindered the progression of CM into ACM in the CCMPA case study. These factors have the greatest impact on the functionability of a participatory management arrangement because they influence the stability of the social-ecological system. Such powerful internal and external forces have the ability to re-configure a management system, permitting multiple policy options in response to the dominant forces acting on the governance system at the time. The externally derived influence of the Reality Show disturbed the process of management, yet the system was able to absorb the socio-political 'shocks' and re-organise into a different governance arrangement. However, what is shown in the CCMPA case study is that if many of these process-oriented factors act at the same time on the social-ecological system, in this case economic recession and a coup, governance arrangements are de-stabilised because

institutions appear to revert back to their cognitive origins – that is, institutions act in their own interests to preserve their inherent functions and identity.

Such rational choice represents a form of historical institutionalism, as the way things were designed at the early stages of the decentralised process. These early designs produced a path dependency on formal and informal patterns for information transfer which has been exploited by participatory governance. Yet new institutionalism offers an explanation of how communities can compete with and participate on even terms with traditional institutions because it is the collective behaviour of the majority (Haller, 2002). Two forms of new institutionalism exist: 1. duty-bound arrangements where the logic of appropriateness dictates choices to achieve all goals and objectives; and 2. maximizing benefits through rational choice for individual interests (Hall and Taylor, 1996). The CCMPA had the normative goals and objectives to act in a duty-bound way to achieve conservation for the sustainability of natural resources and livelihoods dependent on those resources, i.e., with the awareness of what was supposed to be achieved in the collective domain. Nonetheless different institutions (including communities) behaved to maximize benefits, i.e., to generate financial sustainability of the HCRF by allowing filming of the reality show. By acting in the interests of maximizing benefits for one stakeholder, the CM arrangement was criticized and accused by the communities of 'rational choice institutionalism' to enable individuals within the HCRF to maximize their own personal well-being.

New institutionalism offers an explanation for the limitations of ACM in the CCMPA because it recognises a cognitive element dictating the cognitive understanding by participants of the resource problem. This element dictates that conceptions and assumptions of how things have always been done influence decisions and actions because members of each institution cannot conceive that there may be an alternative (Scott et al, 2000; Thornton, 2004). Through new institutionalism, it is possible to identify the complexity of behaviours, characteristics and norms that dictate participation with other stakeholders. Applied to the CCMPA case study, the lack of shared understanding of the resource problem and subsequent institutional learning has been limited by each institution's perceptions of possible alternative management arrangements. However, through this lens the CCMPA stakeholders have had to conceive of new methods of management simply by their involvement in the governance arrangement, and have moved

towards developing acceptance of, if not understanding of, alternative mechanisms for management.

Still, the understanding offered by new institutionalism would imply that ACM cannot emerge from within the social-ecological system as implied by Ruitenbeek and Cartier (2001). Internal decision-making processes, behaviours and complexities of institutions maintain the status quo perception of the way things are done, and do not allow challenges to these assumptions from the inside. This case study has found that even when societal norms have been challenged by key individuals at the local-level, communities have been reluctant to change their actions. Instead, when these challenges were supported or presented by external agents, communities were more willing to consider new options and keen to benefit from new knowledge. This indicates that along with external events, external agents are the catalysts for institutional change at the local level. This interpretation is also accurate at meso and macro-scales where despite greater access to wide sources of knowledge and learning capacity, external events have instigated policy adaptation and institutional learning. Therefore, I argue that ACM is an externally applied management arrangement that encourages social and institutional learning between governance scales, and cannot itself emerge from within the governance realm without external drivers.

6.5. Has CM and/or ACM been an effective management model for the CCMPA, or would a different model be a more appropriate management regime for the locally specific conditions of this case study?

As process-oriented approaches for instigating changes in management policies, both CM and ACM arrangements create winners and losers. High transaction costs are created in the short-term, but the long-term benefits will be development of policy and decisions. However, both arrangements carry a high risk that collaboration and trust will not be gained, making it crucial to consider who will bear the transaction costs (Armitage et al, 2008). Given the background of poorly applied subsidiarity of natural resource management and co-management power remaining within the meso-scale of governance, neither CM nor ACM have been appropriate for these conditions.

A more appropriate management regime, as defined by Jones (2001) would be a ‘middle-ground’ option that utilises the strengths of the state and local user groups following the principles of

good governance. Regulation and monitoring of the HCRF by devolved government agencies has been sporadic to date, but a new system of annual evaluation of protected areas, specifically incorporating locally impacted communities, was implemented by ICF in 2009. This system aims to identify strengths and weaknesses of participatory governance in locally specific conditions, but uses nationally coordinated indicators to provide coordinated administration of protected areas. ICF-led monitoring and evaluation satisfies this 'middle-ground' option because it generates State regulation of protected areas through devolved administration, but maintains the participatory principles of ACM. It also conforms to the hybrid governance arrangement favoured by decentralised natural resource management, but strengthens the role of the State to provide standardised and legitimate management. However, most importantly, communities are actively invited to have an equal role in the evaluation of management, giving them secured influence in subsequent decision-making processes. ICF are providing training for all stakeholders to equip them with the necessary knowledge to evaluate the process and outcome of management, providing a forum for both expert and non-expert knowledge.

6.6. Final summary

This thesis set out to evaluate the effectiveness of co-management and adaptive co-management in the CCMPA case study by examining the ecological sustainability, local livelihoods sustainability and adaptability of the governance framework in two management cycles (2004-2008; 2008-2013). By applying a governance lens to decentralised natural resource management in Honduras, what has emerged is that many processional conditions are also important to enable effective participatory governance in either CM or ACM regimes. Primary factors such as resource perception and historically embedded behaviours held by an institution influence the ability of stakeholders across different governance scales to learn and understand norms and behaviours of other institutions. What has also emerged is the influence of external events on the functioning of management. While some external events have acted to improve stakeholder relations and participatory governance (Reality Show) because the governance system has been able to absorb the disturbance, other external events (recession, coup) have the capacity to break down the participatory linkages if they threaten institutional functioning. In this case study, the slow emergence of participatory governance has produced fragile linkages between stakeholders

that are easily broken because integrated components of trust and shared understanding have not been fostered. As such, threats to the perceptions held by different institutions lead these groups to reinforce their collective beliefs rather than remain open to challenges and new understanding.

The evidence presented in this thesis indicates that the principles of good governance initiated by the Honduran government have been poorly addressed by decentralisation of natural resource management. The principle of subsidiarity to enable locally appropriate governance of the CCMPA was not supported by devolved administration, and private interests dominated the collective interests of local communities, producing a management plan driven by 'ecology without politics'. In the first co-management plan implemented in 2004, resentment caused by socio-economic hardship had built up against the HCRF, and hostility for participation with management provoked a tertiary consultative role for local user groups. This disempowered the local-scale communities and caused further non-compliance with regulations. Despite efforts made to provide alternative livelihood options for fishers, mainly in tourism-based projects. The narrow fishing focus for alternative development benefitted the cooperative fishers but marginalised individual fishers, the most vulnerable, even further.

The unique involvement of the Reality Show 'Survivor' became the saving grace of the local communities, providing an opportunity to voice their discontent with management practices. The resultant second management plan was more inclusive of community conditions and gave local communities more power in the decision-making process. But, to mitigate the conflicts between the HCRF and local communities, the second management plan focused on socio-economic objectives at the expense of conservation, driven by 'politics with some ecology'. While this second plan adapted to the socio-economic needs of the local communities some of the necessary conditions to allow effective adaptive co-management were not present. So, improvements to management created a better form of co-management, but lacked the learning components to challenge stakeholder assumptions of society-nature and governance interactions. Furthermore, macro-level political reforms have renewed the interest in decentralised governance and coordinated national strategies for natural resource management. Therefore, management efforts are being focused on developing shared goals between stakeholders for ecosystem conservation and development at regional levels. Implicit in these developments is the notion of developing a

shared understanding of the social-ecological system and adaptive learning to provide best-fit options for localised conditions. This would suggest that more of the necessary conditions for ACM will be available when the current (2008-2013) management plan is revised in the near future, and would produce a more balanced third management plan - ‘ecology with politics’.

CHAPTER 7: CONCLUSIONS

7.1. Partial success of CM and ACM in the CCMPA

This case study has found that along with the necessary conditions for ACM identified by Armitage et al (2008), there are many other supplementary factors that have played an influential role in the development of participatory governance under any form of co-management arrangement. While scholars have theorised about the importance of shared understanding of natural resources, double-loop learning as a way challenge underlying institutional assumptions about those resources, and networks to provide mechanisms for feedback to achieve co-management, in practice these have been difficult to achieve. This thesis provides further evidence to support those regional characteristics in tropical developing countries in the Caribbean: low levels of trust within and between institutions, perceptions of corruption, poor environmental education of local user groups, poorly coordinated national policies and poor monitoring of extractive activities - all contribute to practical difficulties.

What this thesis has found is that, similar to Gray's (2008) analysis of co-management of the Gladden Spit Reserve in Belize, co-management arrangements can still function when stakeholders at different governance scales have not developed a *shared* understanding of resources but are instead *aware* of different types of knowledge to form mutually agreed policies based on negotiation. Whilst this does not provide evidence of institutional learning at all levels, it does illustrate the importance of the more powerful stakeholder groups (in this case the HCRF and devolved government agencies) understanding the values and conditions of natural resources from the local user group perspective. Although this does not necessarily involve challenging their own assumptions to change the values they ascribe to the resources, it can change the priorities of those stakeholders during the *process* of decision-making. In the CCMPA case study, without living within the communities to experience fishing-based livelihoods, all other groups of stakeholders will not be able to fully understand the socio-economic or cultural value of resources from the local-level perspective. Therefore, the best that can be, and has been, achieved is an acceptance of those values to find a mutually agreeable (shared understanding) 'best-fit' management solution, e.g., areas of lesser ecological significance opened to small-scale fishing effort to support local livelihoods.

Lack of cognitive understanding and associated double-loop learning does not necessarily mean that ACM cannot be achieved. Policy treatments as hypotheses and iterative adaptation can still occur in a system provided it has open and bidirectional feedback mechanisms to monitor the ecological and socio-economic outcomes of those policies that can merge different types of knowledge during the evaluation stages. In the CCMPA case study, the ecological feedback channels available were under-used in favour of political feedback channels (local-level protests), and linkages to enable information to be passed between the HCRF and local communities were ill-selected and misrepresentative.

7.2. The future for governance of the CCMPA – the third management cycle

The future of the CCMPA and HCRF may be about to radically change. The majority share-owner of the CCMPA holding 56% of the protected area, a private businessman, has indicated his intention to sell his share. Personal relations between this owner and the Director of the HCRF have been strained over disagreements over the performance of the HCRF for its conservation or community development obligations. In June 2010, due diligence on behalf of two polarised potential buyer consortiums was carried out, estimating the value of the shareholding at $17 million. One of these consortiums is a group of Mexican investors seeking to promote tourism in the protected area, and the other is a group of American investors and donor organisations seeking to promote conservation. Importantly, the American consortium is being spearheaded by one of the Directors of GAD, the local NGO with well-established links with both the HCRF and the Garifiuna communities within the sphere of influence. Should this consortium be the successful buyer, the current owner has agreed to re-invest 15% of the sale value (circa $2 million) back into the HCRF to generate financial self-sufficiency. This fund (based on 5% savings interest) would then finance all conservation projects and critically, all sustainable development projects for the foreseeable future (GAD KI interview, 28/08/10).

Regardless of which consortium succeeds with their proposal to buy the CCMPA majority share, crucially for the Garifuna communities the State will always retain its responsibility to manage the natural resources inside the protected area. This will to permit the fishing rights of access of the communities in the sphere of influence of the CCMPA. However, the new owners will have an important influence over the third management cycle that will begin the revision process by 2011. The third management cycle could instigate a greater sense of the owner's responsibilities

for management rather than their assumed rights over the resources, which was the original point of selling the majority share of the CCMPA. However, if successful the tourism-based buyers may incite further grassroots protests should they plan to develop the terrestrial resources through rational choice governance. This would directly compete with the ecotourism dependency of some of the local communities, and potentially deny traditional access to wood and fruit. On the other hand tourism within the CCMPA and surrounding areas may increase further, which will help to support local livelihoods. Tourism inside the CCMPA is currently around 8000 visitors per annum (HCRF KI interview, 05/06/07) which is considered the maximum capacity, yet the HCRF would have the ability to increase this number to achieve substantial financial gain to alleviate political pressure. Conversely, the conservation-based buyers would promote local-level cooperation with enforcement of conservation regulations, and also supply micro-funding to develop sustainable community-based enterprises providing a broader range of livelihood options. This would challenge the conventional role of the resource owners by taking responsibility for conserving both the ecosystem and its local users.

What is most striking about these potential changes in the ownership of the CCMPA is the potential impact they would have on the participatory governance structure. If the Mexican group become the new majority owners, the management arrangement is likely to remain a co-management approach because the decision-making power of the other stakeholders will not change. However, if the American group gain ownership there is a real chance that more of the conditions identified for adaptive co-management may be achieved because a stronger hybrid governance arrangement will be created by sharing power more equitably. The conservation and sustainable development objectives for the CCMPA will also be more integrated, promoting the development of shared understanding and iterative feedback.

In addition to these potential changes in ownership and governance arrangements, the boundary of the CCMPA is due to be extended in 2010/2011 by Congressional decree. This will increase the size of the protected area to approximately double its original size (HCRF KI interview, 08/06/09). The extension of the area will have two important impacts on the future of management: 1. No industrial trawlers will be permitted to pass through the coastal waters that are critical fishing grounds for the local communities, thereby improving the conditions for fishing inside the CCMPA; but 2. conversely, these areas that are currently open access and have

no restrictions will be subjected to the gear and temporal closures that regulate the CCMPA. This has the potential to undermine the communities' ability to generate income from these important shellfish grounds. Inclusivity in the CCMPA will also remove the traditional community rights to fishing grounds in close proximity to each coastal community, creating an open access situation for those fishers currently with access rights, which could increase competition between resource users. It is because of these potentially negative impacts of the planned extension that some resistance exists within the local communities. In light of the socio-political conflicts highlighted in this thesis during the revision process for the second ACM plan, it will be even more important for the third management plan to include local resource users at the heart of participatory governance.

The extension of the CCMPA has the potential to renew the importance of the HCRF and participatory governance to conserve natural resources and the associated local livelihoods in light of the decline of the macro-economy. Yet the CCMPA is not the only protected area due for extension. Another protected area, the terrestrial Pico Bonito National Park, is also planned to be extended in 2010/2011 up to Rio Esteban. Not only would that give advantages to Rio Esteban for conservation funding, it would also force coordination between two Municipalities (Atlántida and Colon), local resource users, associated devolved government agencies and the HCRF for the creation of revised management plans for both areas. These combined extensions will create substantial changes for resource use patterns at local-levels and priorities for management, making it critical to improve environmental education for all stakeholders. Fresh impetus for governance will again be able to create the enabling conditions for adaptive co-management with a greater pool of resources, knowledge and interest available to be used in the process.

The third management plan should look to the regional spiny lobster initiative for governance hints and tips. The spiny lobster initiative was set up to address a far larger geographical problem than the CCMPA – to promote regionally sustainable small-scale lobster fisheries in the face of a new law prohibiting scuba diving for lobster, due to be enforced in Honduras and Guatemala in 2011. The initiative offers a more participatory and locally-specific process than the HCRF, termed the SCALE[1] approach by the Global Fish Alliance (GFA). It combines best practices from various disciplines to support sustainable collaborative action towards common goals

[1] Sustainable fisheries and aquaculture approach

following the same hybrid governance structure as CCMPA (individuals, local user groups, state, businesses, institutions and partnerships). The process has achieved success quickly because it empowers local leadership structures with supporting strategic action by GFA. Thus resources are shared via community-driven environmental solutions. The organisation has been operating in Honduras since 2008, but spent one and a half years 'networking, in conversations, putting people together to see the other sides….looking at authority….. and creating a base of important issues' (GFA KI interview, 18/07/10). Representatives were chosen over months of consultation with communities all along the north coast using snowballing network analysis to create a multitude of leaders for each working group; therefore the process is not dependent on key individuals if they leave the process. After this extensive period of consultation, trust building and developing shared understanding between stakeholders, the initiative created and published its strategic campaign in April 2010. This approach has proved to be very successful with local user groups, and has gained better public acclaim in under two years than the HCRF did over eighteen years. This is because the institutional values of the spiny lobster initiative are fundamentally different from those of the HCRF, believing that local user groups 'demonstrate the energy and commitment to pull together' to promote changes within the fishery.

The management process of this initiative adheres to the principles for ACM: stakeholders are given deadlines to make decisions or feed information into the management cycle to produce iterative feedback and continual momentum. This uses WWF 'best practices' for participation to reduce the inequalities between stakeholders allowing 'all stakeholders have a say in decision-making as a majority rule….so for good or bad its shared responsibility' (GFA 10:1). Information is also reviewed and policy adaptations are made every two months, presenting the opportunities for each sector's representatives to 'have a say' in the decision-making process. While this approach may have high transactions costs associated with the potential imbalance of technical versus non-technical information (although all participants are given technical training to help them understand and engage with the process) it promotes the sense of ownership of all stakeholders in the governance process, and with it generates transparency and efficiency.

The spiny lobster initiative has implications for the wider regional governance of coastal fisheries. Not only has the initiative promoted local-level leaders, it has also promoted state leadership and administration using the pre-existing network of high-level stakeholders as an

advisory group to the state. Thus the Spiny Lobster Initiative Working Group has successfully transitioned into the Technical Advisory Group for the Honduran Ministry of Fisheries regarding lobster regulation (www.globalfishalliance.org). In this way, political will has been generated through the network, and a management process has been established which has now developed sufficient membership and momentum to continue. But the GFA has been able to work directly with stakeholders at all levels to foster support for sustainable management of fishery resources because it has the financial and political support of global alliances. The critical difference between the GFA and the HCRF is that it works as a facilitator organisation, and does not have any accountability or responsibility to the state for its actions. As a facilitator, its primary role is to create networks and enthusiasm for a project without having to enforce regulations or evaluate effectiveness. While the HCRF has State-imposed responsibilities for the CCMPA and relies on facilitators to fund and drive its decision-making process, the success of the spiny lobster initiative provides options that would improve the CCMPA governance system.

7.3. Regional implications

The understanding of co-management, adaptive co-management and participatory governance in this case study generates learning that can be applied at the regional governance level of the MBRS area. The CCMPA example illustrates the need to implement governance at the scale which is closest to the resource problem, to create policy cycles that reflect the real-time impacts felt by local resources users. This also encourages cross-scale relationships that are mutually sustainable in the long-term. By strengthening governance at the local scale, transparency and inclusion in the management process serve to promote the communication linkages needed to support conservation regulations, and will produce more functional policy at the implementation level. What is also apparent is the need to link the CCMPA to other MPAs in the region. This would improve ecosystem conservation through biological connectivity, and also increase the scale of the resources-to-be-governed in line with the scale of the governing network.

7.4. Wider implications

In addition to the contributions this research can make to the Caribbean region, there are also wider implications for the management of marine protected areas in any coastal location. The in-depth analysis of social capital in this case study revealed that the connections and corresponding

perceptions that exist in small-scale coastal communities are different between individuals, households, families and groups. While the localised conditions for the social capital available in this case study were specific to the Garifuna, such analysis serves to deepen understanding of the socio-cultural sub-texts that guide and inform community governance that should be incorporated into the process of MPA decision-making.

The identification of trust as a key driver of non-participation with the management process by stakeholders at varying levels in this case study illustrates the importance of trust-building to establish a legitimate decision-making process. Whilst trust has long been identified as a key feature for all co-management arrangements, this research exposes the consequences of loss of trust to both the efficient functioning of MPA management processes and relationships within stakeholder groups. This research illustrates the importance of developing shared terms of reference that represent the interests of each stakeholder group as a mechanism to provide greater transparency in the decision-making process. This would enable all representatives to be accountable to other stakeholders involved in the process as well as their internal members, and maintain their involvement in the management process based on organisational interests as opposed to personal agendas.

This case study also provides evidence to support the implications of the scale of decision-making in MPA management to support and correspond with community-based livelihoods. In the CCMPA case study, the importance of maintaining occupational multiplicity was embedded in Garifuna cultural, and regarded as an implicit necessity in the development of sustainable alternatives to fishing. As such, the promotion of ecotourism as a livelihood to *replace* fishing instead of a livelihood *option* undermined the participation of local users in the management process and compliance with fishing regulations. Instead, the information used in the decision-making process should include and reflect the ecological understanding and information used by local resource users to determine livelihood activities. The inclusion of information from the micro-level provides a platform for local communities to participate in the management process, and provides the basis for the allocation of user rights and the development of alternative livelihoods. Without this basis at the micro-scale, outcomes and associated policy implications can be undermined if the conservation focus for those outcomes is incongruent with the sustainability of local livelihoods.

7.5. Implications for wider sustainable development of communities in Honduras

While the political coup hindered the progress and process of ACM in the CCMPA at the time, there are signs that the emergent new government (National Party of Honduras) elected in November 2009 has reinvigorated interest in devolved participatory governance. Regional government agencies (SERNA, DIGEPESCA) have re-focused their efforts on ecosystem-wide conservation, receiving coordinated strategies from national level to implement regionally appropriate policies. Their visibility and profile in local communities has been raised, and together with communities are emerging as key players in EBA conservation. In Rio Esteban, two community meetings were held in June 2010 with representatives from SERNA, the Municipality of Colon and other grassroots environmental NGOs working in the area. These meetings were designed to create an action plan for community development over the next 25 years, incorporating the need for conservation awareness and sustainable regeneration. Such forward thinking and environmental sensitivity did not exist on a broad scale in previous years, but a new political cycle and national development promises for local-level assistance have enthused stakeholders at all levels for the renewed possibility to push forward conservation and sustainable development. Under these circumstances, the necessary conditions for ACM can be developed, harnessing the interests of different sector and level stakeholders to combine abilities and share a common goal for regional development. Environmental education of both terrestrial and marine human-nature interactions is now being provided by SERNA and ODECO in coordination with the HCRF.

However, regional ecosystem education is detracting focus from the specific needs and uses of the CCMPA, as local communities have begun to look at the opportunities within the wider ecosystem for development. The previous struggles with the HCRF and social shift away from fishing-dependent livelihoods mean that the CCMPA is unlikely to benefit from the collective environmental consciousness of the institutions involved in its governance framework.

7.5. Recommendations for future participatory governance arrangements in the CCMPA

Specific recommendations to improve the fisheries management arrangement in the CCMPA would be:

- Implementation of the ICF annual monitoring of management performance for protected areas, establishing standardised benchmarks for delivery of conservation, socio-economic and governance objectives.

- Provision of regular meetings of all stakeholders throughout the 4/5 year management cycle aimed at reviewing policy outcomes to encourage continual feedback of the effects of policies as hypotheses, and enable adaptation to occur once negative trends have been identified. Although regular feedback is an obvious requirement for an ACM system, it first needs to develop a shared understanding of the resource problems to produce mutually agreed objectives.

- Technical capacity training needs to be provided at all stakeholder scales to identify the different perspectives of resource use impacting institutions' norms and rules. Technical capacity to develop shared understanding needs to be focused within the non-expert realm as this represents the majority of stakeholders by number. Community and school-centred environmental education will enhance connection with the social-ecological system to balance social shift and out-migration.

- To improve the legitimacy of management, the HCRF needs to publish and provide all stakeholders with an annual financial report, offering full transparency of transactions. Spending needs to become accountable for all operations performed by the HCRF to publicise the allocation of resources. This should be published in conjunction with the ICF annual review to provide a national comparison of economic performance with other protected areas. This would provide a benchmark for local-level stakeholders to assess the fiscal performance and comparative community-development of the HCRF.

- Wider inclusion of fishers, women and non-fishing dependent households to improve the participatory capacity of each community is necessary to remove socio-economic stratification and reduce process dependency on key individuals. Mechanisms to improve participation and information flow between the local and meso-scale stakeholders should focus on accessible media and individuals available within local communities – radio, poster campaigns, multiple representatives and youth groups. There should be a particular

emphasis on community youth for engagement with natural environment and fishing cultures to maintain community traditions, and to build future capacity for participation.

- Promotion of alternatives strategies needs to incorporate the whole community to develop supportive networks for sustainable developments, not exclusively to benefit fishers.

- The importance of fishing for food security and poverty alleviation needs to be protected by recognising the true number of fishers within the community (including income dependents, non-dependents and occasional fishers). A register of all fishing activity both inside and outside the CCMPA needs to be created to establish CPUE of different fisher groups and communities. Log books of fishing activities and catch need to be made a legal requirement to obtain and maintain a fishing licence, and Municipal funding needs to be made available to administer this monitoring. Fisher cooperation must be generated by the HCRF through trust-building and empowerment to promote ownership of the resources to provide a less intrusive form of monitoring than enforcement.

- Empowerment of local communities/fishers as enforcers of the regulations is needed because increased responsibility for the resources will promote ownership and produce community-level sanctions.

- Consistent interactions between the HCRF staff and the communities must be developed, including regular interaction with the Directors. Lack of communication with the current HCRF Director was perceived at the local-level as a lack of interest in the plight of the local communities, revealing the importance of visibly demonstrating an understanding of and commitment to improving local-level conditions.

7.6. Future research

While this thesis has looked into how participatory governance processes and outcomes emerge and can adapt to ecological, socio-economic and governance conditions, future research will need to examine how they are maintained in the face of changing external conditions. While this research has sought to understand the enabling conditions for effective co-management arrangements in the CCMPA, it also generated new research questions that would shed more light on decentralised governance – what social capital is available in local-level communities,

how does this manifest in trust and social cohesiveness and what type of external forces act to destabilise social capital? This understanding would improve knowledge of why traditional community-level sanctions for use of natural resources have not been more significant in the Garifuna communities, and whether community-wide environmental education to promote shared understanding of resources would be undermined by issues of trust and non-compliance within each community. Drivers of non-compliance also need to be explored further to determine what education and regulatory responses are necessary to improve community-level adherence with regulations. While compliance has been driven primarily by socio-economic deprivation rather than lack of support for management, it is necessary to understand individual motivations to risk being caught beyond the economic reward. This thesis has discovered that these motivations are bound up in the stratification of power and wealth within the coastal communities, yet non-compliance is greatest in Chachahuate where such problems do not exist to the same degree. Therefore, heterogeneity of compliance and its associated drivers will be an important component of future research to improve the governance system in the CCMPA.

Appendix 1: Annual summary of multi-stakeholder interviews documenting location, organisation and connection with the research

Year	Location	Research methods	Organisation/community group	Reason for interview/connection with research
2006	Communities	Fishers focus group	Fishing cooperatives Individuals fishers Patronato members	Fishers knowledge, participation in decision-making, CPUE, livelihood strategies
		Key Informant interviews	Heads of tourism groups Tourism facility owners	Community participation in decision-making
		Tourism interviews		Dependency on tourism, employment opportunities
	La Ceiba	Key Informant interviews	HCRF Director	Managing agency of CCMPA
			WWF	Funded the first CCMPA management plan
			DIGEPESCA	Government fisheries agency
		Tourism interviews	Tourism Board, Atlantida	Coordinator of tourism activities
			Operation Wallacea	NGO
	East End	Key informant interviews	Navy patrol	Monitoring of fishing activity, enforcement of regulations
	Cayo Menor	Key informant interviews	HCRF personnel	Managing agency of CCMPA
2007	Communities	Fishers focus group	Fishing cooperatives Individuals fishers	Fishers knowledge, participation in decision-making, CPUE, livelihood strategies
		Key Informant interviews	Patronato members Heads of tourism groups	Community participation in decision-making
		Tourism interviews	Tourism facility owners	Dependency on tourism, employment opportunities
	La Ceiba	Key Informant interviews	HCRF	Managing agency of CCMPA
			WWF	Conservation projects and alternative livelihood projects within CCMPA communities
			DIGEPESCA	Government fisheries agency

			CODHEDOR	Government forestry agency
			TNC	Funded the second CCMPA management plan
		Tourism interviews	Tourism Board, Atlantida	Coordinator of tourism activities
2009	Communities	Individual fishers interviews	Fishing cooperatives Individuals fishers	Fishers knowledge, participation in decision-making, CPUE, livelihood strategies
		Key Informant interviews	Patronato members Cooperative members	Community participation in decision-making Social capital and development of WCP scheme
		Tourism interviews	Heads of tourism groups Tourism facility owners	Dependency on tourism, employment opportunities
	La Ceiba	Key Informant interviews	HCRF	Managing agency of CCMPA
			WWF	Conservation projects and alternative livelihood projects within CCMPA communities
			DIGEPESCA	Government fisheries agency
			CODHEDOR	Government forestry agency
			SERNA	Government agency for protected areas
			The Nature Conservancy	Spawning aggregation site project, funding agency
			ODECO	Garifuna representation group
			OFRANEH	Radical Garifuna representation group
		Tourism interviews	Tourism Board, Atlantida	Coordinator of tourism activities
	East End	Key Informant interviews	Navy patrol	Monitoring of fishing activity, enforcement of regulations
			HCRF resource guards	Terrestrial and marine enforcement officers

Appendix 2: Annual summary of fieldwork documenting time spent in each location, research techniques applied and the numbers collected.

Year	Months					Location	Duration	Research methods	Number attained
	May	Jun	Jul	Aug	Sep				
2006						Rio Esteban	1 week	Household survey Fishers focus group Tourism interviews	34 1 4
						Nueva Armenia	1 week	Household survey Key informant interviews Fishers focus group Tourism interviews	36 1 2 3
						Sambo Creek	3 days	Key informant interviews Tourism interviews	3 4
						Guadelupe	4 days	Household survey Key informant interviews Tourism interviews	35 2 1
						Chachahuate	6 days	Household survey Fishers focus group Tourism interviews	13 1 1
						East End	1 day	Key informant interviews	2
						La Ceiba	1 week	Key informant interviews	5
						Cayo Menor	1 week	Key informant interviews Data analysis	2
2007						Chachahuate	5 days	Household survey as pilot (due to illness) Key informant interviews Tourism survey Community maps	20 1 8 1
						East End	1 day	Key informant interviews	1
						Rio Esteban	1 week	Household survey Key informant interviews Fishers focus group Individual fishers interviews Tourism survey Community maps	50 1 1 6 20 1
						Nueva Armenia	1 week	Household survey Key informant interviews Fishers focus group Individual fishers interviews	50 2 2 5

								Tourism survey Community maps Participant observation Historical timelines	20 1 1 2
						La Ceiba	1 week	Key informant interviews Participant observation	8 2
						Sambo Creek	2 days	Fishers focus group Individual fishers interviews Key informant interviews Tourism surveys	1 3 1 2
						Cayo Menor	1 week	Key informant interviews Participant observation Data analysis	2 1
2009						La Ceiba	2 weeks	Key informant interviews	10
						Sambo Creek	2 days	Pilot household survey Pilot fishers interview	4 4
						Corozal	2 days	Pilot household survey Pilot fishers interview	4 4
						Rio Esteban	2 weeks	Household surveys Key informant interviews Individual fishers interviews Tourism interviews WCP interviews Participant Observation Community map	34 4 4 10 6 1 1
						Nueva Armenia	1 week	Household surveys Key informant interviews Individual fishers interviews Tourism interviews WCP interviews Participant Observation Community map	37 4 8 10 12 1 1
						Chachahuate	4 days	Household surveys Key informant interviews	11 3

								Individual fishers interviews Tourism interviews WCP interviews Participant Observation Community map	8 5 4 1 1
						East End	3 days	Key informant interviews Tourism interviews WCP interviews Participant Observation Community map	4 2 2 1 1
						La Ceiba	1 week	Key informant interviews Tourism interviews WCP interviews	14 10 9
						Cayo Menor	2 weeks	Data analysis	

Appendix 3: Household survey 2009

Number _____ Community _____

Date _____

Interviewer _____

Translator _____

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 (specifiy)	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?

6. Yes/No	7. Where else live?	8. Reason?

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

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

10. 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

11. 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

12. Do you have close family and friends in the community? 13. Relationship? 14. Where do they live?

Name	13. Relationship	14. Where live (neighbourhood)

15. Do you have close family and friends outside this community? 16. Relationship? 17. Where do they live?

Name	16. Relationship	17. Where live (neighbourhood)

18. Do you own or rent your home?

a. Own	b. Rent

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

a. Private	b. community

20. How are decisions made by the community for the location of a house?

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

a. Yes	b. No

SECTION 1A: OCCUPATIONS

22. A. 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

23. A. 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

24. 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

25. A. Have you done any other work different to your current job? B. what? C. % income for the household. D. why not doing it now? (2007)

a. Yes/no	b. What	c. % income	d. Why not now

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

a. Men	b. Women

27. What jobs did men and women traditionally do in this community?

a. Men	b. Women

28. What job/jobs would you like your children to be involved with?

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

a. Food	b. Fuel	c. Transport	d. Gear	e. Clothes
f. Rent/mort	g. Bills	h.	i.	j.

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

a. Increased	b. Decreased	c. Same

31. A. Do you receive any remittances/money from anyone? B. who? C. how much? D. where from?

a. Yes/no	b. Who	c. How much	d. Where from

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

d. Increased	e. Decreased	f. Same

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

SECTION 2: NATURAL RESOURCES

34. Which marine and terrestrial resources have been traditionally used by people in this community?

35. Are marine or terrestrial resources more important to people in this community? Why?

a. Marine	b. Terrestrial
Why	Why

36. Where do you take these resources from?

a. Community	b. Surrounding land	c. Cayos Cochinos	d. Other

37. How were these resource managed within the community before the HCRF? Who would make rules?

38. Has there been a change in the number of reef fish in the last 5 years? Why? (2007)

a. Increased	b. Decreased	c. same	d. don't know
Why	Why	Why	Why

39. Has there been a change in the number of shellfish in the last 5 years? Why? (2007)

a. Increased	b. Decreased	c. same	d. don't know
Why	Why	Why	Why

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

a. Increased	b. Decreased	c. same	d. don't know
Why	Why	Why	Why

29. Has there been a change in the cost of shellfish in the last 5 years? Why? (2007)

a. Increased	b. Decreased	c. same	d. don't know

Why	Why	Why	Why

30. 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

31. Where do you buy fish and shellfish from? (2007)

a. Local	b. Self	c. Middleman	d. Other

32. What foods are traditionally eaten in this community? (2007)

33. What % of your household food is produced in the community/bought from elsewhere?

a. Produced locally	b. Bought

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

a. Family	b. School	c. HCRF	d. NGO	e. Other

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

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

36. Do you think the condition of mangroves of the Cayos Cochinos are: (2006)

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

37. Do you think the conditions of the coral reefs of the Cayos Cochinos are: (2006)

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

38. Do you think the conditions of the sea grasses of the Cayos Cochinos are: (2006)

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

39. Do you think the conditions of the wildlife/fish of the Cayos Cochinos are: (2006)

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

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

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

41. Are a. marine resources or b. terrestrial resources more important to the community? Why?

a. Marine	b. terrestrial
Why	Why

42. a. Are you aware of any rules for using the resources of the Cayos Cochinos? B. what are they? (2006, 2007)

a. Yes/no	b. What

43. What would you do to increase the number of fish in the sea? (2007)

44. What can affect the number of fish in the sea? (2007)

Factors/mechanism		How?
Fisheries	Number of fishers Overfishing Commercial Gear	
Human	Pollution Tourism	
Environ	Seasonality Weather	
Ecology	Habitat Spawning Feeding	
Socio-cult	Political Economic Social	
Other	Religion Unexplained Don't know	

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

a. Yes/no	b. Who

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

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

48. Are you happy with this representation on behalf of the community? (2007)

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

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

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

50. 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

51. Could you rank the following in order from 1 to 10 of most important to you to protect and maintain: (2008)

a. Clean air	b. Clean drinking water	c. Low noise	d. Clean sea	e. Terrestrial wildlife
f. Marine wildlife	g. Reefs	h. Trees and plants	i. Fish to eat	j. Food to eat

SECTION 3: SOCIAL CAPITAL

52. Are there any formal or informal groups in the community? (2007)

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

53. Are members of these groups generally the same gender, race, age, religion, job, education?

a. Group	b. G	c. R	d. A	e. Re	f. J	g. E	h.

54. 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

55. A. Who would you discuss something that is important to you with? B. relationship

a. Who	b. Relationship

56. What kind of things would you discuss?

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

a. What?	b. Who with	c. How resolved

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

59. How are these decisions made? (2007)

60. How do you become aware of these decisions? (2007)

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

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

a. Yes	b. No

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

a. Individual	b. Community

64. Do you think this will change in the future? How and why?

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

SECTION 4: COLLECTIVE ACTION

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

a. Event	b. When

67. What traditional are associated with being Garifuna?

68. 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

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

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

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

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

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

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

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

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

SECTION 5: SOCIAL COHESION

73. Are there any problems in the community?

74. Would people work well together within cooperatives? (2008)

75. Do you have confidence in the distribution of income generated from cooperatives? (2008)

SECTION 6: TOURISM

76. What do you understand by the term sustainable development? (2008, Discourse)
77. If no, understand concept – how to explain?
78. What do you understand by the term ecotourism? (2008, Discourse)
79. If no, understand concept – how to explain?
80. What do you understand by the term climate change? (2008, Discourse)
81. If no, understand concept – how to explain?
82. What do you understand by the term conservation? (2008, Discourse)
83. If no, understand concept – how to explain?
84. What do you understand by the term pollution? (2008, Discourse)
85. If no, understand concept – how to explain?

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

Activity	Product	Who

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

Activity	Product	Who

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

Activity	Training needs	whom

89. 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

90. 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%

91. Why do people not benefit from tourism? Who are they? (2008)

92. 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					

93. What are the unique things about Garifuna life that you think tourists would want to see/experience? (2008)

94. Which are the best months of the year for tourist to visit here? (2008)

95. Future scenario setting? (would this work for household surveys?)

Idea of having cards with different extremes scenarios, 100% - 0% of every option, and allowing respondents to create their idea of the future?
Could work for future hey believe will happen, and future they would most like to see happen, to give an indication of if they actually want the changes they are predicting?

100% fishing	0% agriculture	0% tourism	0% construction
75% fishing	25% agriculture	0% tourism	0% construction
50% fishing	50% agriculture	0% tourism	0% construction
25% fishing	75% agriculture	0% tourism	0% construction
0% fishing	100% agriculture	0% tourism	0% construction
0% fishing	25% agriculture	75% tourism	0% construction

96. Age?
97. Number of years at school?
98. Ethnicity?
99. Languages spoken?
100. Religion?
101. Gender?

Appendix 4: Fishing grounds of individual fishers in Nueva Armenia (Fishers focus group 2007).

Appendix 5: Fishing grounds of individual fishers in Rio Esteban (Fishers focus group 2007).