

CONSERVATION AND SUSTAINABLE USE OF MARINE RESOURCES IN KUNA YALA,
PANAMA

By

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To Henry, for all your patience and support.

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LIST OF ABBREVIATIONS

CBD	Convention on Biological Diversity
CGK	Congreso General Kuna, [Kuna General Congress]
CODESTA	Conservación y Desarrollo Sostenible en Acción [Conservation and Sustainable Development in Action]
FUSPU	Fuerza Unida de Seis Pueblos, [United Force of Six Viallges]
IMR	Income is mainly derived from marine resources
IOS	Income is mainly derived from other sources than marine
IPAT	Instituto Panameño de Turismo, [Panamanian Institute of Tourism]
IUCN	World Conservation Union
MPA	Marine Protected Area
PDO	Private Development Organization
pph	Persons per household
RPMK	Red de Patrimonio Marino Kuna, [Kuna Marine Patrimony Reserve]
STRI	Smithsonian Tropical Research Institute
WCPA	World Commission on Protected Areas
WWF	World Wildlife Fund

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Over 50% of the world's population today lives in coastal areas, which poses increasing pressure on the marine environment. Overfishing, coastal erosion, pollution and recreational misuse are among the most severe threats especially faced by coral reef ecosystems. While Marine Protected Areas are established to mitigate these threats, management performance overall has remained low. Frequently, conflicts arise where local populations are not adequately included in management processes. While participation of local and indigenous groups in decision-making and planning is increasingly emphasized in the scientific community, it is still often only marginalized.

This study presents local resource use patterns and perceptions and attitudes towards marine resource management of six indigenous fishing communities in Kuna Yala, Panama. The Kuna are the sole owners of their marine resources, and have developed their own management strategies to address pressing issues such as overfishing, pollution, and coral extraction. The first part of this study assessed socio-economic benchmark data to support the Kuna in the creation of a solid data foundation of demographic, economic, cultural, and governmental information. The second section of the study focused on assessment of knowledge of local attitudes and perceptions with regards to management practices. Issues were analyzed based on geographic

location, profession, role in decision-making, culture, and conservation-related awareness. Data were collected in the summer of 2007 among six marine-dependent communities within the indigenous territories of the Kuna in northeastern Panama. Methods included secondary literature, in-depth interviews with selected participants, unstructured interviews with key stakeholders, and participant observation. Probing questions were based on selective themes such as, perception of threats to marine resources, awareness of issues and problems with management, and identified solutions.

A primary compilation of baseline information showed the importance of creating a solid foundation of baseline data for monitoring purposes and to target conservation measures more effectively. This assessment served as a foundation for in-depth thematic analyses on attitudes and perceptions of fishermen towards marine resource management. Results highlighted significant comparative differences among selected variables. General socio-cultural structures of communities reflected their attitudes and perceptions of marine resource use (e.g. impact of culture and traditions). Age, cultural changes and new needs, as well as spiritual belief, played instrumental roles among divers. Participation in local decision-making processes had positive impacts on levels of knowledge, information, and fostered critical thinking among participants.

Beyond these findings, results also denoted that conservation and development was more effective in the long term if the host population could develop strategies and plans for biodiversity conservation. Ownership and empowerment were strong indicators to influence local livelihood to promote sustainable use of marine resources. The utilization of indigenous knowledge and local involvement in planning were some of the major managerial implications with respect to effective management of marine and coastal resources.

CHAPTER 1 INTRODUCTION

Conservation and development organizations have emphasized the importance to include community participation for the management of protected areas (PAs), however participation often remains only instrumental: communities are expected to participate in the implementation of management initiatives, but are frequently excluded from design and decision-making processes (Vermeulen & Sheil 2007; Diegues 2008). Plans and strategies are mostly formulated and developed by outside experts, who are often not familiar with the livelihoods and needs of the local population.

Results of community-based conservation and development (Tallis *et al.* 2008) illustrate the dilemma experienced by conservation and development experts: Pressures and constraints are imposed by funding organizations to foster the notion that expert-led strategies are most effective. Plans frequently have to be pre-defined and activities planned adequately in order to remain within given limits of time and content. Local partnerships are emphasized, but pre-defined plans and strategies are perceived to be more secure with regards to project success than locally-based approaches (Tapela *et al.* 2007). Further, true partnerships are time-intensive. However, it is especially this expert-led approach and the limited involvement of local communities that frequently lead to project failures. Despite the claim that this paradigm has changed towards integration of local people, only few successful examples exist (Jeanrenaud 2002; Brown 2003; Chapin 2004). Thus, the dilemma remains that limited integration inhibits long-term success as local people tend to abandon imposed conservation measures as soon as a project is terminated. Conversely, total participation might not create the anticipated results and can hinder towards ensuring funding from donor organizations.

This research argues that, if certain approaches are changed, locally-based conservation and development can indeed be more successful. While challenges to conservation and development have been much discussed, this study emphasizes two aspects to improve and thereby contribute to overall higher success rates in the achievement of dual conservation and development goals.

The focal areas of this study are:

- Assessment of baseline information to provide a general foundation on local livelihoods, socio-economic issues and resource use patterns
- In-depth analysis of attitudes and perceptions towards marine resource use and management

A deeper understanding of local communities, their livelihoods, resource use practices and economic development, is a crucial aspect that is often not given sufficient consideration (Barrett 2001; Berkes 2004; Robinson 2007). This understanding includes socio-economic, demographic, and cultural baseline information with relevance to the respective involved communities. This preliminary assessment of baseline information helps conservation practitioners to gain a structured overview into local systems and livelihood strategies. It also creates a foundation for the development of socio-economic indicators that are needed to undertake monitoring activities. If this demographic, economic, cultural, and environmental data is compiled by local stakeholders (with outside support) it can also create a sense of ownership towards the resource, and can foster community empowerment and stewardship. Furthermore, a comprehensive foundation of socio-economic information will be of great use in the application of the adaptive management concept. In this context, periodic assessments can help to detect changes in livelihoods, resource use patterns, or cultural change, and thereby target and adjust conservation and development activities. Given that local stakeholders are the impetus of the activities this can trigger long-term maintenance of monitoring or other activities.

However, assessment of general socio-economic information is not enough. Conservation and development activities can only be successful if differences in communities and within groups are understood, and if local concerns and priorities are considered in all planning and management activities. Therefore it is important to assess local attitudes, perceptions, and concerns that are related to natural resource use and management, because any interventions must complement local livelihood strategies and must be embedded in the local cultural traditions (Bunce & Pomeroy 2003; Cinner & Pollnac 2004). This can in turn only be accomplished if areas of conflict and local priorities are known, and also if local stakeholders remain the principal actors in the initiatives.

The case study that provides the stage for this research consists of six indigenous fishing communities in Kuna Yala, Panama: Wargandup, Akuanusadup, Nargana, Digir, Tikantiki, and Maguebgandi. The Kuna's extraordinary status as a sovereign territory within the country and offers clearly identified property rights that provide for a fundamental basis as these facts frequently contribute to conflicts. As clearly defined, owners of their land and the respective resources, the Kuna have adapted ways to use their marine resources in a sustainable manner, while simultaneously preserving their cultural heritage. Their success in the maintenance of political and economic independence is the result of strict laws that limit outside influence that includes non-governmental organizations and research institutes. Also, any type of work within Kuna Yala needs previous approval of the Kuna Congress. This approach has granted the Kuna sole ownership over their resource management, and thereby ensures them full partnership with organizations.

Based on this background, this study has focused on these two issues. Chapter two provides a baseline assessment of socio-economic information in the six villages. The main

issues that arise throughout the primary data collection are highlighted such as limited data availability and the importance of local contributions. Findings are tailored to existing local conditions and to advance local Kuna initiatives with regard to conservation of marine resources while protecting their cultural heritage.

Chapter three focuses on the in-depth analysis of community perceptions and attitudes towards marine resource use and current management practices. Emphasis was given to identify differences between communities and professions, and among different levels of participation. Further, attitudes and perceptions were analyzed with respect to local regulations and compliance issues.

Overall, this information will assist conservation and development projects to become more successful as some of the most pressing reasons for failure (lack of knowledge of local issues, lack of participation, conflicts) may be mitigated.

CHAPTER 2
SOCIO-ECONOMIC ASSESSMENT OF INDIGENOUS FISHING COMMUNITIES: THE
CASE OF KUNA YALA, PANAMA

Introduction

Conservation and development initiatives are based on the theory that their dual social and environmental goals are mutually compatible (Berkes 2006). To ensure these goals are being met, the results of conservation and development aims need to be measured at both the socio-economic and the biological level. Yet, it is difficult to assess changes at both ends and measure how activities at the conservation level might affect local livelihoods and vice versa.

Conservation today almost inevitably affects people. However, monitoring activities often focus on the biophysical realm at the population, community, or ecosystem level. Indicators that focus on biological and environmental assessments exist at both the professional and the community level and have been extensively discussed (Danielsen 2000; Fraser 2006; Nichols & Williams 2006; Gough *et al.* 2008). Socio-economic and cultural indicators of sustainable resource management practices have received less attention in the literature (Danielsen 2000; Gough *et al.* 2008). Specific indicators focus almost exclusively on social disciplines such as cultural anthropology or social psychology (Reed *et al.* 2006). Yet, it is important to assess changes at the socio-economic and cultural levels in order to determine outcomes of conservation strategies on peoples' livelihoods. However, socio-economic and cultural indicators are site-specific and require indicators that match local needs (Carruthers & Tinning 2003; HwanSuk 2006). Different approaches have been conducted to identify sustainability indicators, mostly with a focus on tourism (King *et al.* 2000; Hughes 2002; Lee 2004; HwanSuk 2006; Reed *et al.* 2006). However, the emphasis has been on introducing or discussing concepts to develop the indicators, such as community participation and focus groups. Criteria and thematic issues that encompass indicators have received less attention.

As a result, socio-economic indicators need to be developed for each setting to match local needs. In doing so, the process of engaging local people in the selection of indicators has shown to create a sense of community empowerment, increased responsibility towards natural resources (Corbiere-Nicollier *et al.* 2003; Lundquist & Granek 2005), and higher participation in management activities including monitoring (Fraser *et al.* 2006; Danielsen *et al.* 2008). Community empowerment is especially strong where local people are the main drivers of conservation activities (Danielsen *et al.* 2005; Garcia & Lescuyer 2008). However, external support is often necessary and should be provided where local communities lack technical or administrative knowledge, but all decision-making should remain within the local community (Danielsen *et al.* 2008). Based on this approach to community empowerment, it is the responsibility of the community and the local authorities to create a set of socio-economic indicators that reflect local issues, conditions and priorities.

To address this shortcoming, international organizations such as the Convention on Biological Diversity (CBD), World Wildlife Fund (WWF), and The World Conservation Union (IUCN) have developed comprehensive “checklists” to support communities and scientists in the formulation of indicators that include biological, socio-cultural, economic, and political dimensions. More specifically, a checklist in this context is a tool to identify gaps and ensure that all areas for monitoring activities are conducted. In interdisciplinary issues such as biodiversity conservation and tourism development, the danger of incomplete data assessments can be mitigated if all noted areas are addressed. Furthermore, there is often a lack of available data in remote areas that have been understudied.

Monitoring relates to evaluation of changes based on certain identified criteria. Baseline information is the first step for the development of a monitoring system as it describes the existing social, environmental, and economic conditions (CBD 2007).

Baseline Information Assessment

Baseline information provides the benchmark data needed to create a monitoring system. The collection of detailed socio-economic information to develop a resource management program can assist to understand specific community and household conditions, resource use patterns, and economic activities. Also, it can establish baseline conditions for future comparisons (CBD 2004).

Two documents that have been developed to assist in the development of a comprehensive monitoring program are, The “User’s Manual on the CBD Guidelines on Biodiversity and Tourism Development”¹ (CBD 2007), and the “Socio-Economic Monitoring Guidelines for Coastal Managers in the Caribbean”² (Bunce & Pomeroy 2003). Both manuals provide comprehensive and detailed information regarding the compilation of baseline information as a foundation for socio-economic monitoring programs. While the CBD-Guidelines have a focus on tourism development, they can also be applied to general conservation and development programs. The synthesis of both approaches to create a baseline assessment of socio-economic data is as follows:

Typically, a socioeconomic monitoring program, which should be an integral part of any conservation and development initiative, begins with a baseline assessment using a wide range of variables that provides a foundation for future reference. It is important to note that this

¹ General guide developed by the Convention on Biological Diversity

² Guide specifically designed for Caribbean coral reef ecosystems; developed by the World Commission on Protected Areas (WCPA) and Australian Institute of Marine Science

assessment of baseline information is necessary for all stages of the program, beyond the initial phase (CBD 2007). Based on this information, indicators can be selected and subsequent monitoring activities planned. It is important that monitoring is only effective if undertaken on a long-term basis at periodic intervals, as impacts of conservation and development are often only visible at a timely delay (Carruthers & Tinning 2003).

Compilation of baseline information should not be undertaken randomly. Scoping is an important tool to ensure that the collection of baseline information targets the right information at the right level of detail from reliable sources (CBD 2007). Scoping assists to assess the type of information that should be measured, the type of information that is already available, and helps to identify missing information that is needed to complete the assessment (Carruthers & Tinning 2003; CBD 2007). Data for a socio-economic baseline information assessment should include community and household level demographics, economic and social conditions, cultural aspects, stakeholder information, and information regarding laws and regulations (Bunce & Pomeroy 2003; CBD 2007). However, it is important to note that not all information may be required for each assessment. Scoping assists in collecting strategic information based on local needs and associated issues.

Case Study: Community-Based Conservation in Kuna Yala, Panama

The Kuna Indians in Northeastern Panama distinguish themselves from other indigenous cultures by their success in defeating the Panamanian Government in 1938, which granted them sovereign rights to their lands. This achievement is remarkable as few other indigenous groups have accomplished such a feat (Howe 1998; Andrefouet & Guzman 2005). This success has contributed to the creation of a strong and proud culture that has been able to maintain most of its cultural traditions. However, the Kuna have struggled to maintain their traditions given the increasing external influences and pressures that demand adjustments and pose grave threats to

their culture (BMU 2003). These new challenges include overpopulation and over extraction of live coral to build seawalls, pressures from tourism, and extensive overfishing of spiny lobsters (*Panulirus argus*) to satisfy increasing needs for cash income (Castillo & Lessios 2001).

Globalization and outside influences have also induced conflicts especially among the different generations.

The Kuna live in the archipelago of San Blas (also referred to as *Comarca Kuna Yala*³), which consists of extensive coral reefs with over 350 islands and islets, and adjacent tropical forests on the coastal mainland (BMU 2003). The Kuna inhabit 38 of these islands along with 11 communities situated on the mainland. The exact Kuna population is unknown but is estimated to be approximately 50,000 people; half of the population live in Kuna Yala and the other half in Panama City and Colón (Solis 2007, personal communication).

Study Site

The study site is located in the northwestern part of the Comarca in the district of Nargana and consists of the five island communities, Wargandup, Akuanusadup, Nargana, Digir, and Tikantiki, and one mainland community, Maguebgandi. The estimated permanent population of the six communities is 3000-8000⁴ (Solis 2007, personal communication) (See Figures 2-1 and 2-2). The six communities are at different stages of modernization. Maguebgandi, Tikantiki, and Digir are the most traditional communities, as Kuna culture is strong with a dominating traditional lifestyle. Akuanusadup, Wargandup, and Nargana have experienced extended influence from the Panamanian military who has maintained presence for almost a century. Loss of local cultural traditions and changes in lifestyle towards western desires (e.g. television, cell

³ District of the Land of the Kuna

⁴ These numbers vary so greatly because many people migrated to the mainland while sometimes still being counted as residents of Narganá

phones, western-style clothing) are dominant in these communities. All six communities can only be accessed by boat. They are located in relative proximity to one another and can be reached within one to two hours by local water transportation. On the western end lies Wargandup; Nargana and Akuanusadup are the adjacent communities to the east and located close enough to each other that they are connected by a wooden bridge. Towards the eastern side is Digir, which can be reached within a two-hour boat ride, while Tikantiki is an additional half hour away. Maguebgandi is located furthest to the east and located on the coastal mainland.

The primary economic activities consist of artisanal fishing, and diving for lobster, octopus and queen conch. Kuna fishermen tend to fish for subsistence purposes about three to four times per week, mostly for personal consumption unless catches of the day exceeds personal use. Fishermen also engage in lobster diving for additional cash income. An increasing but unknown number of adolescents has focused almost exclusively on lobster harvest and has frequently left for lobster diving trips five to six days per week. Lobster diving as cash income is slowly replacing subsistence agriculture in Kuna Yala. Cultural change and the growing need for cash income is the main driver of this change. As a result, overfishing of lobster is causing rapid decline of the lobster population, while harmful fishing techniques pose additional threats to the marine ecosystem.

Tourism is the fastest growing economic sector in Kuna Yala. While the western parts of Kuna Yala have been heavily trafficked by cruise ships and have several hotels and cabanas, other areas including the research area, are not impacted as heavily although drastic increase in tourism is predicted. Towards the eastern border of Kuna Yala in closer proximity to Columbia, tourism is virtually nonexistent. Within the study site, tourism takes place mainly in form of private yachts that cruise the waters and is largely unregulated.

In order to allow the Kuna to maintain economic independence, all tourism-related developments have to be Kuna-owned. Yet, tourism control mechanisms are still largely lacking. Only one of the six communities in the research area, Digir, has developed basic tourism infrastructure. Over the past 10 years, the people of Digir have collectively developed *community-based tourism* in the village. The community dedicated one area of the island as “punta turística”, which comprises of four cabañas that sleep up to 12 people at a time, one restaurant and beach access. The cabañas and the restaurant are completely community-owned. All income generated from the cabañas and the restaurant belongs to the community, and tourism-related decision-making processes are community-run. Whenever tourists visit, the community raises a flag that indicates the presence of visitors. During these times, no local person is allowed at the punta turística, in order to secure access for swimming, snorkeling or sunbathing for the visitors and also to minimize cultural conflicts. Other management strategies developed include rules for visiting the village such as the introduction of an entrance fee of US \$ 3.00 per person/day, and mandatory escort by one of the three local guides. The cost of US \$ 1.00 per photo of a Kuna empowers the local people with the option to participate in tourism activities. Many women in the village sell “molas”⁵ at fixed prices to avoid intra-communal competition, and thereby create a valuable income alternative.

In terms of administrative structure, the six villages form a unique group as they are jointly represented through the local association *Fuerza Unida de Seis Pueblos*⁶ (FUSPU). Through this joint representation, FUSPU conducts social, economic, political, and environmental matters and represents the communities as one voice in the Kuna General Congress (CGK), which is their

⁵ Molas are handmade blouses traditionally worn by Kuna women.

⁶ United Force of Six Villages

highest political authority. FUSPU has further taken responsibility for conservation-related matters and has identified short, medium and long-term conservation and development goals. These goals are based on visions and needs developed by the community representatives to facilitate more sustainable use of marine resources. Several small-scale projects aim to achieve these goals incrementally while ensuring local control and decision-making with the Kuna.

In 2007, FUSPU launched the project *Red de Patrimonio Marino Kuna*⁷ (RPMK) with the support of a Panamanian private development organization (PDO) that has been collaboratively working with the Kuna for several years. The project's goal was to facilitate conservation and sustainable use of marine resources in six "biodiversity hotspots" that were identified by the Smithsonian Tropical Research Institute (STRI) in 2003 (Guzman *et al.* 2003). The project had three main objectives: (1) capacity-building to control resource use, (2) visitor management, (3) monitoring of biological and socio-economic indicators.

Purpose of Study

This study is a contribution to the third objective of the aforementioned program and provides initial data collection of socio-economic information which specifically focused on demographic, cultural, economic, and governance-related information. Since this was the first attempt to create a foundation in information assessment, data availability was sparse and often difficult or impossible to obtain throughout the research period. However, this was to be expected due to the remote location and lack of previous research studies. Also, as the Kuna traditionally are an orally based culture, they have little experience with respect to structured data collection.

⁷ Kuna Marine Patrimony Reserve

In supporting Kuna aims to develop their own monitoring plans, this study provides socio-economic data compilation, including demographic information, infrastructures and occupations, economic activities, socio-cultural issues, and governance. The study objective is noted as follows:

- Primary assessment of socio-economic data at the community and at the household level, including population demographics, economic activities and resource use patterns, socio-cultural issues, and governance.

In the event of unavailable or missing data, additional data collection will be completed by local stakeholders in follow-up data compilation to complete the assessment. This process provides the initial step to support the Kuna in their aim to engage in local monitoring activities to assess conservation and development projects.

Methods

Data Collection

Data were collected during June – July of 2007 among residents in each of the six communities: Wargandup, Akuanusadup, Nargana, Digir, Tikantiki, and Maguebgandi. Although the field work was arranged with and approved by the project authorities, introductory meetings were held in each community with the respective village chiefs (saila) to explain the purpose of study and to ensure their consent. Core methods included collection of secondary data, semi-structured and unstructured interviews with key stakeholders, and participant observation. Secondary information was mostly gathered from the local health care centers in Digir and Nargana, local authorities in Akuanusadup, the partner organization in Panama City, and from the Smithsonian Tropical Research Institute (STRI). Thirty-two semi-structured interviews were conducted among participants who were identified and selected based on criterion and snowball sampling methods (Bernard 2000). The study population consisted of two stakeholder groups: Local stakeholders who participated in conservation and development projects coordinated by

FUSPU (10 interviews), and local fishermen who were the primary user group of the marine resources (22 interviews). Some fishermen were marginally involved in the projects through voluntary participation in community meetings, while others were not involved in the projects. Three additional interviews were conducted with local key stakeholders who were knowledgeable in regional processes and respected members of their communities.

Instrumentation

The interview template was created in the Spanish language. All interviews were conducted in Spanish and Kuna with the help of a local translator. The translator accompanied every interview and ensured that even those interviewees who were fluent in the Spanish language could express their opinions and beliefs in the most detailed and comfortable manner. The average length of duration for an interview was one to two hours. Each interview was immediately reviewed with the translator after conducting it to ensure that all information was captured and understood adequately. Each interview was later typed in the Spanish language to avoid data loss through translation.

The interviews comprised of four main sections (Appendix A). In the first section, participants provided demographic and socio-economic information. This included information on age, community in which participants lived, household demographics, and years of education. Socio-economic information included occupation and main source of income. In the second section, respondents were asked about the types of marine activities they were engaged in, which included spatial information on fishing grounds, financial gains from marine resources, as well as types of catch and the portions used for sale and personal consumption. The third section asked for the participants' perceptions with respect to the overall conditions of marine resources, and their perception of threats, problems and solutions that affect the current marine resource management. In the fourth section, participants were asked for their knowledge of existing

regulations of marine resource management. Each interview concluded with an option for additional comments. Interviewees were given pseudonym names to ensure personal confidentiality. Data about tourism development as well as additional information on community demographics were obtained from the village officials, local health care centers, and from key stakeholders such as those directly involved in tourism enterprises.

Data Analysis

Based on the research objective, data were segmented into the following themes:

- **Population demographics** at the community and the household level. This includes inhabitants, age and gender distribution, education, as well as infrastructure and occupation in the communities. It also includes household information, health status, migration rates, and religious compositions.
- **Economic activities**, including coastal and marine goods and services, resource use patterns, values of goods, and market orientation. This section also includes types of impacts and outside influence, tourism profile and existing traditional systems.
- **Socio-cultural issues**, including gender roles, survival and loss of cultural heritage, traditional belief systems, and culturally sensitive areas.
- **Governance**, including management structure, community organizations, stakeholder participation, legislation, and land ownership and rights.

These categories are based on the CBD-Guidelines and on the Socio-Economic Monitoring Guidelines mentioned earlier, and have been altered through scoping to customize to local conditions (Appendix B).

Results

Population Demographics

The number of *inhabitants* varied considerably between the communities⁸. Tikantiki and Digir had the largest populations with 890 inhabitants each, while Maguebgandi was the smallest community with only 207 inhabitants. Wargandup had 440 inhabitants; Akuanusadup and

⁸ Population census data for each community was gathered from the local health care centers in Digir and Nargana

Nargana each had 370 and 605 inhabitants, respectively (Table 2-1). *Gender* distribution showed that the communities of Wargandup, Akuanusadup, and Nargana had slightly more males than females; the other three communities had slightly more females (Table 2-1). The *age* structure in each community was similar (Table 2-1) and is summarized in one age pyramid (Figure 2-3). The largest age division is composed of children and young adults, which consisted of almost half of the population. The smallest age group in the communities consisted of people who were 59 years or older⁹. The average life expectancy for the communities was at 70.2 years (Organización Panamericana de la Salud 2005).

The *numbers of households* in each community are estimates. Accordingly, Tikantiki, Digir, and Nargana had between 100-120 households, while the other three communities had between 27 and 74 households (Table 2-2). The average number of *members per household* varied slightly between the communities. Wargandup had the lowest number of household members with an average of 5.9 persons per household (pph). Nargana and Akuanusadup had an average of 6.1 pph and 6.2 pph; Tikantiki and Maguebgandi each had an average of 7.4 pph and 7.6 pph, while Digir showed the largest number with 8.5 pph (Table 2-2).

Men generally had higher *education* than women. On average, men had 5.3 years of schooling, women had on average 2.2 years of schooling (Table 2-3). Differences could also be seen between the communities. Inhabitants from Wargandup, Akuanusadup and Nargana showed a higher average level of education than participants from Digir, Tikantiki and Maguebgandi. Digir showed the overall lowest level of education despite the community's growing significance as a tourism destination. This could be due to the fact that the existing income alternatives negatively influence people's choice to pursue an education.

⁹ Note that the data for every person 70 years or older are summarized. Separate data were not available.

In the less traditional communities, *Kuna language* is minimally spoken and slowly replaced by Spanish as the dominant language, and many Kuna traditions are also not practiced. Before and during the Kuna Revolution in 1925, communities such as Akuanusadup and Nargana were one of the entry points for Panamanian military due to the airstrip in Akuanusadup, and were thus exposed more heavily to western culture. Only recently the schools have begun to teach classes in Kuna language. Traditional music and dances are also slowly being reintroduced as part of the school curriculum.

Primary *occupations* in the communities revealed structural differences between the westernized communities of Wargandup, Akuanusadup and Nargana, and the traditional communities of Digir, Tikantiki, and Maguebgandi. Agriculture and fishing were the most important activities in all six communities. However, Wargandup, Nargana and Akuanusadup also had public functionaries such as administrative personnel (Table 2-4). Wargandup, Nargana, and Akuanusadup also had an advanced *infrastructure* including electricity, while the only bank and secondary school was located in Nargana (Table 2-5). Of the more traditional communities, Digir had the most constant influence from foreigners due to its engagement in tourism but lacked consistent electricity.

Tikantiki had a few trained local guides and had a community-owned museum with a television, but there was no organized tourism infrastructure and visitor numbers were unknown. The museum was mainly used by the local school and the local conservation organization “Balu Uala” for environmental education of children and adults. Maguebgandi had the least infrastructure of all six communities. Its remote location on the mainland without any major roads and limited accessibility have kept this small village somewhat isolated from the other

communities. Maguebgandi was also the only community that did not have public telephone access.

Economic Activities

Coastal and marine activities

Information on fishing locations and types of species caught were assessed to provide information on areas that were overfished or that provided the best preserved habitats. Most fishermen had their personal *fishing locations*. Although some areas were more frequently used than others, most fishermen identified their own spots through visual reference points that were mostly not revealed to others. Frequent answers given by the participants remained vague and merely described fishing grounds as: “open sea”, “where there are fish”, or “places known through reference points”. Several participants stated that they used between 25-50 different locations for fishing and lobster diving. Of those named locations, the most frequently used areas were the Cayos Holandeses and Bugadup¹⁰. Additional fishing grounds included the reefs of Kanildup, Tupile, Dup Sormulo, Cien Brazas, Uskuarsukup, Gannirdup, and Diadup. All islands were located within a two hour boat ride in a local cayuco (dug-out canoe). A general practice that seemed to be dominant by older fishermen with more experience was to use each fishing ground only once in 15 days and switch to a new place. Many fishermen who practiced artisanal fishing (i.e, the traditional Kuna style of fishing by only using a nylon thread) also used the protected areas¹¹ which have been established around the communities by the local conservation organization “Balu Uala”.

¹⁰ The Cayos Holandeses are a group of uninhabited islands surrounded by pristine coral reefs and increasingly frequented by tourists and fishermen

¹¹ Artisanal fishing is the only form of fishing allowed in these areas.

Fishermen caught a wide range of *fish species* (Figure 2-4). Most frequently caught species were red snapper and lobster, which were both used for sale. Miscellaneous species of small reef fish were generally referred to as “various”, or “a little of everything” and mainly served for personal consumption.

The *financial value* for fish has remained steady over the last 10-15 years. The average amount of fish caught per day varied. Fishermen caught an average of two to five pounds per day for personal consumption, or five to ten pounds per day if they intended to sell their catch. Most of the small reef fish were not divided by species. At the absence of a scale, the fishermen have developed their own estimate, whereby 7-10 fish equal one pound, depending on the size of the fish. These reef fish were usually sold at one US \$ 1 per pound or for seven fish (7 misc. fish = 1 lb = US \$ 1.00). On average, fishermen caught approximately 50 fish or 7 pounds of fish per day, which would give them an income of US \$ 7 per day, if the entire catch was sold. Larger or more valuable fish such as red snapper had a different value and were sold in single units. One pound was sold at US \$ 0.50, thus at half the price of the miscellaneous fish, but the larger size of the snapper made up for the difference. One red snapper at 10 pounds could be sold for US \$ 5 (1 red snapper = 10 lb = US \$ 5.00).

Of the three dominant types of seafood gained from the marine resources, lobster was the most popular catch. Octopus had only recently gained in price from US\$ 0.50 per pound ten years ago to US\$ 1.00 per pound. The lobster population has become endangered due to continued exploitation and increasing *market value* as a delicacy. Lobster was sold either to a local intermediary or as direct sale. The intermediary had a fixed price of US\$ 4.00 per pound. Most of the communities had an intermediary who was also supposed to act as a control for

compliance of the local regulations¹² on lobster diving. The divers presented their catch to the intermediary who weighed the catch in their presence and paid them directly. All information was recorded in a log book¹³, where the name of the diver was noted along with the amount caught and money paid. The intermediary then sold the purchases to a second intermediary who arrived daily in the sector by airplane from Panama City. This second non-local intermediary in turn supplied hotels and restaurants throughout Panama. Direct sales had a higher fixed price of US\$ 4.25 per pound. Direct sales usually went to tourist vessels and yachts, to hotels, and to tour operators in Kuna Yala. There was no control over these sales; therefore existing regulations on lobster fishing were often not enforced. During the closed season in spring, many lobster divers turned to direct sales to reduce the loss of income. Frequently, these direct sales also included illegal fishing techniques.

Overfishing of lobster has had significant *levels of impact* on the population. According to the respondents, the growing number of lobster divers has been leading to a rapid decline of the lobster population. Participants stated that they (the divers) had to dive much deeper than in the past. While 10 - 15 years ago, lobster could be found at a depth of 3 - 10 feet, today divers had to go to a minimum depth of 15 – 20 feet, and often even deeper. Based on these estimates, the lobster population declined drastically between 1990 and 2007. On average, lobster divers caught 34 pounds per day in 1990. In 2007, participants stated that they caught an average amount of 15 pounds per day (Figure 2-5). In addition, lobster diving was a group activity. Most people ventured in groups of three. In 1990, each diver caught an average of 10 pounds of lobster in one

¹² Regulations on lobster diving includes a minimum length of the lobster tail of 8 cm to ensure only matured lobster are caught, prohibition of catching females that carry eggs, and a closed season for catching lobster in general during a three month recovery period from April through June (called “veda”).

¹³ Unfortunately it was not possible to view these log books for research purposes. Most of the older data were stored somewhere else and the data available was held as confidential by the local organization Balu Uala.

day. Currently, one diver harvested about 5 pounds of lobster in a day, which equals to approximately US \$ 20. Thereby, the amount of catch has been reduced by more than half over the last 17 years. The decline of lobster could also be related to its growing economic value. With increasing scarcity, the market value for lobster has increased. Estimates on prices per pound varied, as some people referred to prices generally "in the past", while others gave the price they remembered from 10 years ago, or even 30 years ago. Still, participants were in agreement that the price for lobster was much lower in the past. Based on the responses, the calculated average price for one pound of lobster in 1990 was at US \$ 2.50, which meant that in 17 years, the price has almost doubled (Figure 2-6).

Traditional systems

During non-fishing days, the Kuna tended to their *agricultural fields* in the mainland, where they grow mostly corn, pineapple and yucca. However, a growing number of young Kuna men have been changing this traditional practice. Many neglect their fields and rather buy those needed crops rather than growing them¹⁴.

The traditional use of the uninhabited islands was *coconut harvest* (Table 2-6). Coconuts had a fixed price of US \$ 0.12 per coconut, but the income generated through coconut harvest has declined over the last decade. This was due to the fact that existing coconut trees were being harvested but no new trees were planted unless their seeds dispersed naturally. One reason for this development could be the growing influence of money. Alien to the traditional Kuna culture, hard currency has been replacing the coconut as original local "currency" or trade object. This has lead to a decrease in the value of coconuts. Some of its value could be retained through sales

¹⁴ Details on traditional farming practices could not be acquired due to lack of time in the field.

to tourists, but this did not meet the quantity of former times. Columbian merchant ships also still bought coconuts from the Kuna and resold them in Columbia for a much higher price.

Tourist profile

Participants estimated that in the summer months of December through March, between 80-200 yachts cruise the waters in the research area. Some boats were operated by national and international agencies and charter up to 20 passengers and take various trips within one season. Other boats were privately owned and often operated by retirees from the United States. Along with the lack of data on the yachts, little was known on country of origin, private or commercial use of the boats, numbers of passengers, etc.

Of all six communities, only Digir has been collecting information on *yacht arrivals* (Figure 2-7). The data were collected from a log book where all yachts that entered Digir documented their arrival. However, these numbers are mere estimates as not all boats documented passenger numbers or names, and those boats that remained anchored outside the community were also not listed in the log book. The Panamanian summer months showed the highest concentration of yachts with 10 to 12 boats arriving in Digir per month, while the winter months of May through August received the lowest arrival numbers.

Visitor statistics were available for the cabañas in Digir, which seem to be reliable, as the manager of the cabañas kept records of visitors¹⁵. However, it was not certain if those arriving by yachts were similar to those sleeping in the cabañas. Given that most yachts were equipped with sleeping facilities, it can be assumed that the visitors who arrived on the yachts and those who arrived by different means were from different market segments. Similarly to the arrival of the yachts, overall tourist arrivals were high from December to March (64 arrivals), but showed

¹⁵ It has to be noted that all tourist arrivals as included in these statistics do not include those visitors who arrive through the Panamanian ecotourism agency “Expediciones Tropicales”.

generally a more consistent pattern throughout the Panamanian winter months from June to October with an average of 25 visitors per month (Figure 2-7). Most of the visitors arrived from the United States and Canada (77 arrivals), followed by European visitors (61 arrivals) (Figure 2-8). Twenty three visitors arrived from other countries in Central America and four were from South America and Oceania, while one visitor was from Asia. Most visitors were between 20-35 years of age; 44% were females and 56% were males.

The other communities did not receive significant numbers of tourists due to the lack of infrastructure to facilitate tourism. Participants in Tikantiki stated that most yachts in sight of the community remained in open waters and hardly ever arrived in the community. Wargandup and Maguebandi did not receive any tourists. Nargana and Akuanusadup did receive some visitors, but there was no written record of arrival numbers or other tourism-related information. There was also lack of available information with regard to income generated from tourism.

Socio-Cultural Issues

Traditional Kuna *gender roles* were clearly defined. Women were responsible for cooking, cleaning, raising children, and have been responsible for maintaining cultural traditions, while men engaged in fishing, farming, and building houses. These activities were valued as equal within Kuna society, but the development of new activities such as tourism have tended to fall within the realm of male responsibility (Marston 2007). This trend has caused men to ‘westernize’ faster than women and has contributed to uneven community growth. Furthermore, the Kuna are a matrilineal culture, whereby men move in with their wives’ family and inheritance of property is often passed to women as men. Every community also had a women’s organization. Their main function included preparation of traditional rituals and other festivities and cleaning of the village. Tourism has had influence on women’s new role as a provider of

additional income from *mola* sales. Specific information on impacts or amounts of revenue generated is unknown.

The Kuna *cultural belief system* is very complex and culturally sensitive areas such as sacred sites are best assessed by fellow Kuna who are most familiar with it. Access to such information could not be obtained due to the sensitivity and duration of the research period.

Governance

Kuna Yala received political, social and cultural autonomy in 1938 after long struggles over its independence with the Panamanian government (Howe 1998). The Kuna people have their own *political system* with the “*Congreso General Kuna*” (CGK) or Kuna General Congress being the highest political authority in Kuna Yala. The CGK is presided by three *caciques* (regional chiefs), who represent the three political units of the Comarca: Nargana, Tubuala, and Ailigandi (Bennett 1999; Andrefouet & Guzman 2005). The CGK further consists of the 49 highest ranking *sailas* (village chiefs), one from each community, as well as political figures, representatives of Kuna labor organizations and professionals who serve as advisors (Bennett 1999, Chapin 2000).

The CGK meets twice per year for several days, during which policies are decided and decisions are made in consensus, and the CGK advises, organizes community project work and settles disputes. The village *gongresos* (community meetings) meets nightly. All community members are given the opportunity to participate in local decision-making processes and village issues, and to participate in traditional chanting and story-telling. The traditional communities have mandatory attendance at least several days of the week. Women are allowed to participate in most meetings but generally only to listen. Less traditional communities such as Nargana and Akuanusadup did not make nightly use of the traditional village congress house. Instead, they

resorted to more westernized political administration in form of a *sailatura* (administrative office of the saila).

Of Kuna Yala's 360 plus islands, only 38 were inhabited and were privately owned by Kuna. *Ownership* was heritable, which has generated large ownership groups over the generations. However, each island usually had one principal owner and several main owners (one from each family) and decisions regarding island use were usually made collectively. Ownership was also strictly organized in terms of development and economic activities. Kuna *legislation* states that all businesses (cabañas, hotels, restaurants, tour operators, transportation, etc.) have to be completely Kuna-owned. This is to ensure the Kuna are able to maintain economic and political independence and to shield them from outside developers. This law is strictly enforced. Unfortunately, this law is slowly getting compromised by increasing pressure from the tourism industry. Anecdotal information included plans of the Panamanian Tourism Ministry (IPAT) to begin large-scale tourism development within the Comarca. It remained questionable if permission to construct resorts and roads in the coastal primary forest was granted by Kuna authorities; this has remained a point of conflict if outside development finally would be allowed in the Comarca.

The other prominent law in Kuna Yala is the seafood fishing ban. In 1999, the Kuna General Congress established a closed season for lobster, king crab, conch and octopus called *veda* from March 1st through May 31st (Castillo & Lessios 2001). The closed season was established to allow the lobster time for reproduction to counteract the rapid decline of the lobster population and other seafood. During this time, lobster, conch or king crab are not allowed to be fished, captured, or sold anywhere within Kuna Yala. Tourists are often not aware of this law, and lack of control mechanisms to enforce this law lead people to sell their illegal

seafood catches to tourists. Often fishermen catch lobster during the closed season and hide them in submerged cages until the end of the veda.

Discussion

This exploratory study of socio-economic data assessment demonstrated the complexity of undertaking a thorough review of baseline information. The systematically collected information on population demographics, economic activities including fishing patterns, and governance issues can help managers to accurately determine those that may be affected by resource management strategies.

Completion of Baseline Information

Based on the list of criteria regarding issues that need to be included in a socio-economic assessment, the following gaps were identified in which future investigations should address:

Population demographics: The population data for Nargana and Akuanusadup listed only those who lived permanently in these communities. Yet, many families moved to Nargana or Akuanusadup for a few years to send their children to the only secondary school in the district. The actual number of inhabitants including temporary migrants was therefore estimated to be much higher than the available population census.¹⁶ Further, information regarding household income or other forms of assessing wealth and health status of communities could not be obtained. This could be undertaken with a thorough population inventory of the six communities. Each household should be mapped, catalogued and include the number of household members and community of origin, especially in Nargana and Akuanusadup. This way, migratory movements between the communities can also be assessed.

¹⁶ The census data was retrieved from the Health Care Center in Nargana, which is updated regularly but only includes permanent residents of each community.

Additional information is also required to complete the occupational structure. It is still uncertain as to how many lobster divers and fishermen currently live in the communities. This information is needed to evaluate the impact of lobster harvesting. Furthermore, the interviews revealed a tendency in decreasing use of subsistence agriculture. Such a socio-cultural change can have important impacts on Kuna culture and survival of their traditional knowledge. A social inventory should be conducted to include an occupation assessment of each inhabitant. This includes professions related to marine resource use, agriculture, retail sales as well as tourism-related professions such as mola sales or tour guides. This information can help to evaluate diversification or specialization of professions¹⁷.

Economic activities: Additional missing information that needs to be collected include the amount of lobster caught per day and per person for each community. It is important to obtain this information from every person who engages in this activity in order to receive an overview on the amounts of lobster caught in the waters surrounding the villages. In addition, size and weight of each lobster can provide viable information on the level to which people comply with the existing fishing regulations. The information provided in this study can be completed by using the log books of the intermediary buyer of lobster. At the time of investigation it was not possible to obtain this information, as the intermediary also functioned as an inspector for the catches and held the log books as confidential. In order to gain insight into the data, closer collaboration with the local association Balu Uala would be helpful.

Even though written documentation is not part of the Kuna culture, it is recommended that information on visitor arrival be documented. Given the rapid growth of tourism, effective visitor management can only be realized if general data are available. Specifically, it is recommended

¹⁷ More details on the main professions in the communities are discussed in Chapter 3.

that all communities within FUSPU record numbers of arriving tourists, length of stay, country of origin, and means of transport. This will be very helpful for future tourism planning. Given the increasing number of tourists who remain on their boats, all yachts entering the greater area of FUSPU should be counted and documented. This information will help in tourism planning, patrolling activities to control visitor impacts and ensuring their appropriate behavior.

A systematic collection of tourism-related data could be conducted at the airstrip in Akuanusadup, as the majority of tourists who do not travel by yacht arrive by airplane from Panama City. Although every person who arrives by plane has to pay an airstrip tax of three dollars, no records are being kept by the administration of Akuanusadup. In addition, the amount of income generated from tourism is unknown. All tourist facilities in the communities should document arrival date, number of people, country of origin, and length of stay of visitors. All income generated in the communities through tourism, including restaurant facilities, cabañas, and sales of souvenirs (molasses, miniature *cayucos* (kayaks), *saborettes* (sarongs), etc.) as well as income generated through sales of fish and seafood to the tourists should be documented and reported to the local congress.

Socio-cultural issues: Given the complexity of Kuna culture and the extent at which local traditions are still practiced, an assessment of cultural issues should be undertaken by local stakeholders, as they are much more knowledgeable. Data should be assessed to include culturally sensitive areas, including historical sites and areas of traditional importance, and an evaluation of survival of the Kuna cultural belief system.

Governance: The political system including current legislations and management regulations has only been briefly mentioned. A thorough investigation of enabling legislation that is currently in existence could help to identify the Kuna's position in context with the

Panamanian government, especially the Tourism Ministry, as there seems to be much discussion as to the level of economic development in the Comarca. Part of a successful conservation and development program also includes information regarding enforcement of legislation or identifying the need for changes or new legislation to become active. Social behavioral patterns such as compliance issues will also generate knowledge with regards to conflicts with the existing regulations and can offer insight into the underlying concerns of the population.

Implications

With respect to monitoring, it is critical to recognize the close link between use of coastal resources and the socioeconomic context of the community. Socioeconomic information provides an understanding of the socio-cultural, economic and political characteristics and conditions of communities that use and are dependent on natural resources (Bunce & Pomeroy 2003). For future monitoring activities, the information compiled in this assessment can be an instrumental tool with respect to the following issues:

First, changes in population demographics can offer information on management activities and impacts on people's livelihoods, population distribution, education and other aspects. Measuring an increase or decrease in the diversification of primary professions (agriculture, fishing, diving, tour guide, production and vending of molas, etc.) can provide viable information regarding the creation of income alternatives. A decrease or slow increase in the number of people engaged in lobster diving can provide information on the progression of lobster exploitation. *Recommendation:* Each household in a community should therefore be assessed periodically to update the different occupations (e.g. every six months). In order to simplify this method, lists can be prepared as the volunteer can merely mark the frequency of occupations encountered.

Second, the collected data on tourism profiles provide important information about tourism trends in the area. Based on this information, tourism education can be specifically targeted and visitor controls can be more effectively practiced. This information should also include those tourists who arrive in their yachts and do not enter the communities. *Recommendation:* One option is to provide the local fishermen with school notebooks and pencils and encourage them to write down the name and date of sight for each boat they encounter during their fishing trips. For tourist arrivals by plane, it is recommended that the airstrip personnel in Akuanusadup place all receipts of airport tax, which is collected from each tourist, in a designated place and periodically count the number of arrivals and document them in a school notebook.

Third, the change of financial value of seafood indicates the increase or decrease in economic significance for certain species. This information can help to raise awareness of the intensity at which certain species (e.g. lobster and red snapper) are being overfished. As described earlier, the price for lobster is generally fixed. *Recommendation:* To measure changes in financial values of certain species, fishermen can simply use a school notebook and make a note every time the price changes, including date and the new price.

Fourth, information on the quantities of lobster caught each day offers clarity about lobster overfishing. This information can be gathered as it is already available in the log books of the lobster inspectors in each community who serve as middle men for the lobster industry in Panama. A decrease in the number of lobster caught could be a sign that new income alternatives have evolved. *Recommendation:* This information should be gathered for each community to further assess if protected areas and environmental education which are only conducted in some communities have an effect on diving behaviors of fishermen.

Conclusion

Numerous failures in conservation and development programs have shown that natural resources cannot be managed from a biophysical focus alone. In order to be able to manage natural resources such as in coastal and marine ecosystems, resource protection and management must be balanced with the local communities' livelihoods.

This study shows the importance of creating a baseline assessment of all information of value for monitoring programs. Following such an assessment, gaps in data availability can become evident and efforts can be targeted specifically to close these gaps. The compilation of baseline information is also important because it shows the complexity of creating a complete assessment. This study explored the availability of data in indigenous communities where, as part of the local culture, information has traditionally been passed orally but no data has been recorded. This aspect should be considered when administering data collection in developing countries. Also, sufficient time and resources should be allocated to complete the assessment.

Further research is needed to follow up on this process and additional research on the proceedings of the Kuna must be conducted in order to establish a monitoring program. Also, the support they receive from the local organization needs to remain active so that they can collectively establish a monitoring system that is self sustaining and embedded in their daily activities.

Table 2-1. Community-level demography

	Age				Gender		TOTAL
	0-19	20-39	40-59	over 59	Male	Female	
Wargandup	207	120	67	46	230	210	440
Akuanusadup	161	79	83	47	190	180	370
Nargana	274	133	126	72	340	265	605
Digir	427	196	144	122	417	472	889
Tikantiki	425	204	151	110	435	455	890
Maguebgandi	114	47	30	16	92	115	207

Table 2-2. Household demographics by community

	No. of households	persons per household
Wargandup	74	5.9
Nargana	100	6
Akuanusadup	60	6.2
Tigre	105	8.5
Tikantiki	120	7.4
Maguebgandi	27	7.6

Table 2-3. Level of education by gender and community

	Years of education male		Years of education female	
	Mean	Years	Mean	Years
Wargandup	2.83	5.7	2.4	4.9
Akuanusadup	3	7.0	1.5	2.0
Nargana	2	4.0	2.5	5.0
Digir	2.55	5.1	0.9	0.9
Tikantiki	2.4	4.9	1.4	1.9
Maguebgandi	2.75	5.5	2.5	5.0
TOTAL	2.65	5.3	1.61	2.2

Table 2-4. Primary occupations by community

	Wargandup	Akuanusadup	Nargana	Digir	Tikantiki	Maguebgandi
1	fishing	agriculture	fishing	agriculture	agriculture	agriculture
2	diving	fishing	agriculture	fishing/diving	fishing/diving	fishing
3	public functionaries	Public functionaries	diving	tourism		
4	agriculture	government retirees	public functionaries	Commerce, merchant ships		

Table 2-5. Infrastructure and businesses in the communities

	Wargandup	Akuanusadup	Nargana	Digir	Tikantiki	Maguebgandi
Infrastructure						
Schools						
Primary	x	x	x	x	x	x
Secondary			x			
Hospitals						
Health Care Centers	x		x	x	x	
Electricity	x	x	x			
Telephone	x	x	x	x	x	
Internet access			x			
Radios	x	x	x	x	x	x
Televisions	x	x	x	x	x	
Newspapers						
Public Library		x	x			
Museum					x	
Airport		x				
Businesses						
Supermarket						
Restaurants		x	x	x		
Food stalls			x			
Gasoline sellers	x	x	x	x	x	
Banks			x			
General stores	x	x	x	x	x	x
Specialty stores			x			
Tour operators				x	x	
Hotels/hostels/cabañas		x	x	x		

Table 2-6. Traditional economic use of six uninhabited islands

Island	Quantity of coconuts harvested / month	Income generated from coconut harvest / month
Diadup	150-200 coconuts	US \$ 18 - \$24 / month
Gannirdup	240 coconuts	US \$ 19 / month
Esnadup	400 coconuts	US \$ 48 / month
Nuu bebe Sibudup	360-420 coconuts	US \$ 30-35 / month
Sichirdup	no information	
Dup Suid	no information	



Figure 2-1. Map of Panama and Kuna Yala marked red. The research area is located in the area highlighted by the square.



Figure 2-2. Detailed map of the research area: The green part shows the coastal mainland, the yellow points are islands. Surrounding the islands are coral reefs, marked blue.

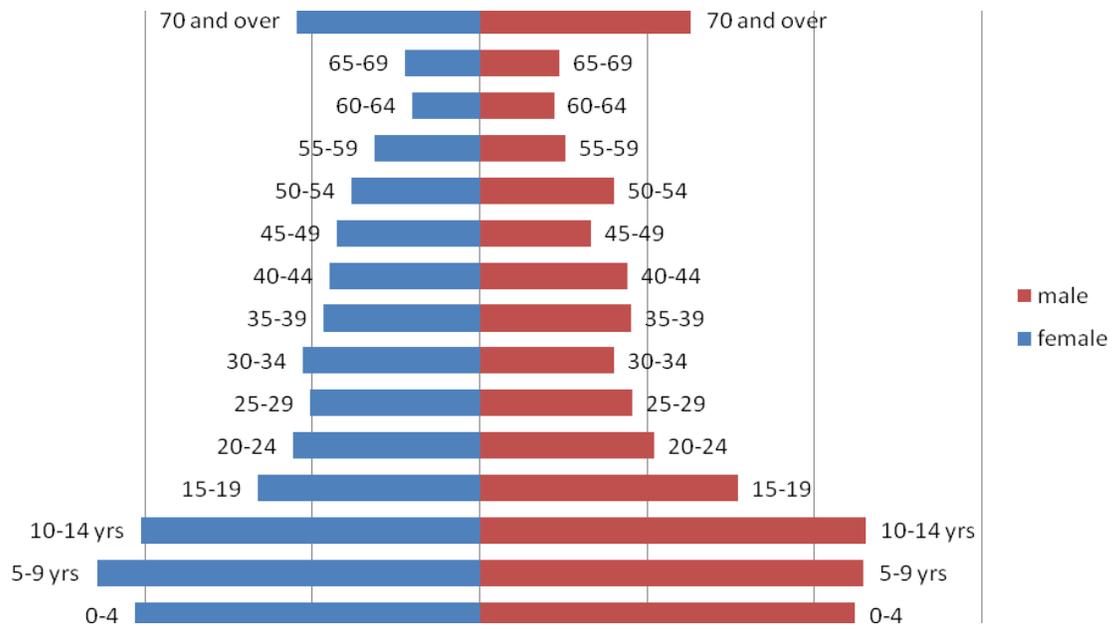


Figure 2-3. Detailed age pyramid for all six communities

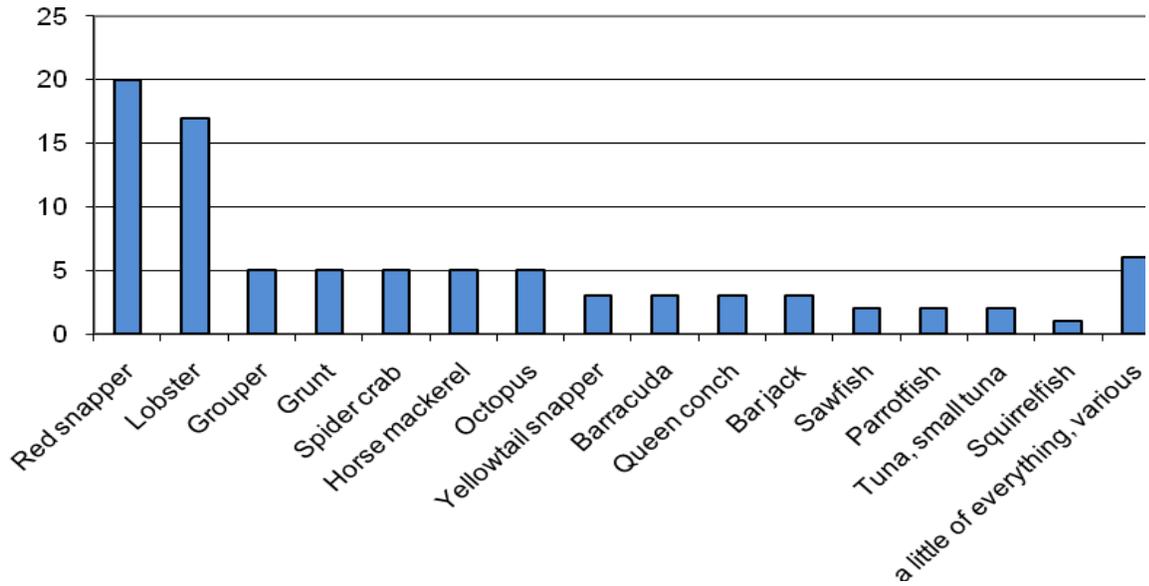


Figure 2-4. List of most frequently caught fish and seafood species

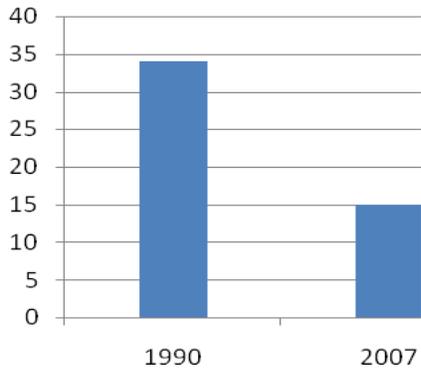


Figure 2-5. Change in amounts of lobster caught in pounds per day: 1990 and 2007

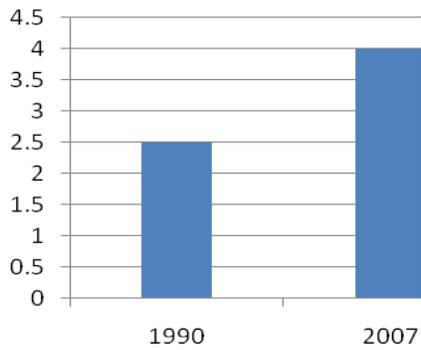


Figure 2-6. Change in price per pound of lobster: 1990 and 2007

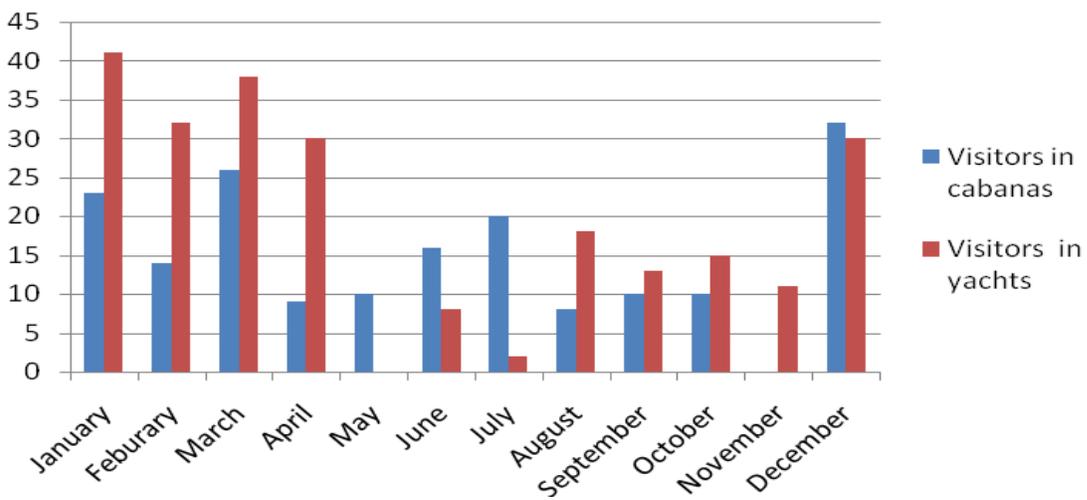


Figure 2-7. Tourist arrivals and type of stay in Digir, 2006

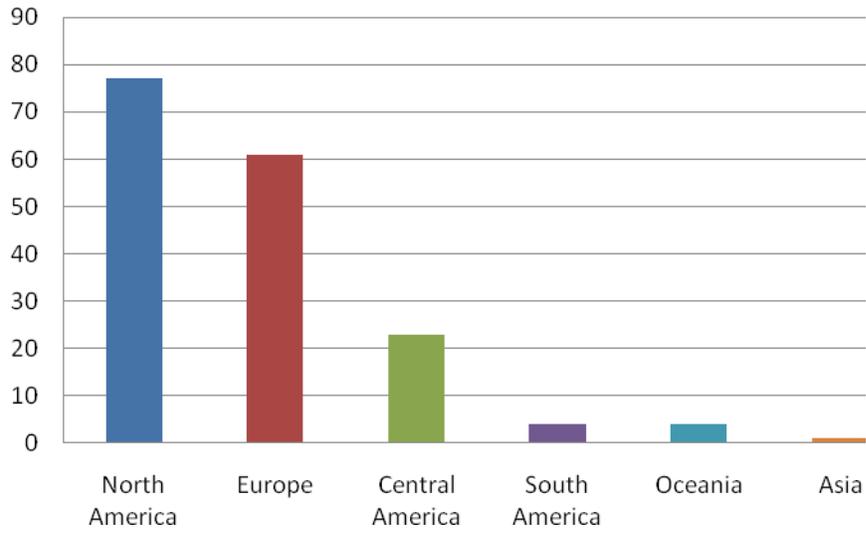


Figure 2-8. Visitors to Digir by geographic region, 2006

CHAPTER 3 ATTITUDES AND PERCEPTIONS OF KUNA FISHERMEN TOWARDS MARINE RESOURCE MANAGEMENT

Introduction

Marine ecosystems are of great importance to human well-being in their provision of services such as food resources, waste detoxification, or flood control (Worm *et al.* 2006). However, human activities have caused rapid decline of marine ecosystems through overfishing, pollution, and habitat destruction, especially in sensitive coastal ecosystems whereby coral reefs are at high risk of permanent damage (Mora *et al.* 2006; Worm *et al.* 2006). Over 50% of the world's population currently lives in coastal areas and the numbers are expected to increase (World Bank 2008). If the rate of marine exploitation proceeds at the current rate, it is estimated that all species suitable for consumption will be depleted by 2048 (Worm *et al.* 2006).

The prevailing managerial response to this decline has been the establishment of Marine Protected Areas (MPAs) to achieve more sustainable forms of resource use (Mascia 2003; Christie & White 2007). MPAs today account for 18.7% of the world's coral reefs (Mora *et al.* 2006). MPAs also have the potential to recover lost biodiversity and reverse current impacts, but the majority of them have lacked major successes in their aim to effectively conserve marine resources (Kelleher *et al.* 1995; Pollnac *et al.* 2001; Mora *et al.* 2006; Worm *et al.* 2006). Based on a global assessment of MPA effectiveness, management performance is particularly low in areas with high coral diversity, namely the Indo-Pacific and the Caribbean (Mora *et al.* 2006). The coral reefs of the Wider Caribbean face severe threats from coastal erosion, overfishing, pollution, and recreational misuse (Kelleher *et al.* 1995; Cinner & Pollnac 2004).

Most areas considered for conservation are inhabited by local and/or indigenous groups whose perceptions and behavioral patterns often differ substantially from the dominant perception held in the Western world. Indigenous people today account for 5% of the worlds'

population, and 15% of the worlds' poorest with higher rates of malnutrition, lack of education opportunities, continuous conflicts over land rights and increasing loss of livelihoods (Nongkynrih 2008). To alleviate this situation, in the last decade active participation of local and indigenous communities in protected area management has become a priority in global conservation and development programs (Tran 2006).

However, even though inclusion of indigenous and local people into natural resource management has received growing importance, they often continue to be marginalized. As the failure rate of conservation and development projects remains high and results are generally mixed (Garnett *et al.* 2007), there has been much debate on the procedures and levels of integration of local and indigenous communities in conservation planning (Agrawal & Gibson 1999; Kellert *et al.* 2000; Redford & Sanderson 2000; Salafsky & Wollenberg 2000; Barrett *et al.* 2001; Brown 2003; Berkes 2004; Chapin 2004; Naughton-Treves *et al.* 2005; Chan *et al.* 2007). Projects often fail to achieve their dual social and environmental objectives largely due to the following issues:

- conservation strategies are established through externally-led, top-down conservation initiatives that do not address local social problems (Brown 2003; Sharma 2008, personal communication),
- adequate resource access is not granted and restricted use zones or displacement occurs, (Chan *et al.* 2007),
- local communities are insufficiently integrated in decision-making processes and development phases (Salafsky *et al.* 2001; Chapin 2004; Garnett *et al.* 2007),
- conservation costs are borne by the local communities, while the benefits go to outsider groups, particularly the tourist industry (Chan *et al.* 2007),
- conflict resolution mechanisms are inadequate or lacking (Berkes 2006; Chan *et al.* 2007),
- second stage planning for periods after project closures, including long-term monitoring and adaptive management to deal with unexpected problems are lacking (Lopez 2008, personal communication).

Integration of local and indigenous people at the community level should be a solution to habitat degradation (Horwich & Lyon 2007). Yet, appropriate management practices such as participatory strategies, zoning plans and no-take areas causes much debate among conservation planners and associated stakeholders. For coastal and marine ecosystems, a large part of this controversy concerns the level of involvement of indigenous fishermen. Fishermen largely resist the establishment of 'no-take' areas, which are often associated with access restrictions and limited freedom, significant financial losses, and loss of primary food resource (Stump & Kriwoken 2006).

Conflicts tend to become severe especially in small island communities that exclusively rely on marine resources. People in these communities are spatially confined and often lack alternative livelihood strategies, which has often lead to violent conflicts. Necessary actions to ensure conservation of highly endangered species are often presumed as limitation of personal freedom and restricted access to important food resources for others (Heylings & Cruz 1998). A prime example is evident in the Galapagos Islands in Ecuador, where conflicts over resource rights have caused clashes between local interests and state-imposed rules and policies (Macdonald 1997; Viteri & Chavez 2007).

Importance of Local Attitudes and Perceptions

Scientists and conservation practitioners are beginning to realize that it is not enough to merely include local and indigenous people in the implementation of conservation strategies. It is important to examine the underlying reasons for regulations to be rejected, and to assess local priorities and resident perceptions towards resource conservation (Cinner & Pollnac 2004). Locals' assessment has received growing recognition as a tool to assess opinions and potential areas of conflict and to direct management strategies to be more effective (Stump & Kriwoken 2006; Broad & Sanchirico 2008; Hernández-Ramírez *et al.* 2008.) Positive and shared attitudes

towards MPAs and associated regulations have a positive impact on management and partnerships among actors, which can assist to implement site-specific management strategies (McClanahan *et al.* 2005; Broad & Sanchirico 2008).

Studies on local attitudes and perceptions towards conservation and development are a relatively recent trend. A number of studies have examined this issue based on differences that include demographic and socio-economic characteristics such as age, education, wealth, household-level information, residence, and occupation (Walpole & Goodwin 2001; Cinner & Pollnac 2004; Gelcich *et al.* 2005; McClanahan *et al.* 2005; Stump & Kriwoken 2006; Tran 2006; Broad & Sanchirico 2008; Hernández-Ramírez *et al.* 2008). Differences between these socio-economic characteristics have demonstrated to influence how people perceive their natural resources and management actions (Cinner & Pollnac 2004).

Differences between communities: Many conservation and development projects target regions that involve several communities or settlements. However, it is important to understand that communities are rarely homogeneous in their attitudes and perceptions. For example, two of six Chilean fishing communities showed strong positive attitudes towards conservation, while others in the same area viewed natural resources merely as a source of income. Similarly, one community perceived fishing activities as highly regulated and opposed further regulations, while other communities seemed willing to accept new regulations (Gelcich *et al.* 2005). Another case showed that small-scale fishing communities in the Bahamas that were more reliant on tourism were more likely to support the creation of MPAs (Broad & Sanchirico 2008).

Differences between occupations: Differences in attitudes and perceptions towards resource management also tend to differ between people based on occupations. Fishermen in Kenya had significantly different opinions than others who did not directly depend on the marine

resources (McClanahan *et al.* 2005). Similarly, attitudes and perceptions of MPA benefits can differ between homogeneous groups as demonstrated by commercial fishermen in Tasmania, and evident of four different categories of opinions: pure restriction to resource access; areas set aside for conservation; enhancement of fishery and larval production; and simply unnecessary (Stump & Kriwoken 2006).

Participation in local decision-making: The success of MPAs also depends on the willingness of local fishermen and other stakeholders to participate in decision-making processes and implementation of management strategies (Gelcich *et al.* 2005; McClanahan *et al.* 2005). Participation in local decision-making is an important variable to assess attitudes and perceptions of local people: it creates a sense of empowerment (Brown 2003), is likely to lead to adoption of responsibility towards a resource, and has shown to produce more positive perceptions towards conservation (Pomeroy *et al.* 1997; Horwich & Lyon 2007). Several studies have concluded that lack of local participation was often associated with lack of information and communication on resource conservation and management. For example, fishermen in Tasmania who participated in local decision-making had more positive attitudes towards regional conservation projects (Stump & Kriwoken 2006).

Perceptions of Regulations and Compliance

Enforcement of and compliance with regulations that pertain to marine resource management can constitute a very problematic issue (Honneland 1999). A general underlying reason for such behavior is that individuals act in their own interest even when their actions do not serve the long-term collective welfare of the community (Ostrom 1990). Criteria suggested to mitigate this effect include limited access to the resource, design of rules by the users themselves, monitoring through accountable individuals, and graduated sanctions (Honneland 1999). Recently, research in the Philippines showed that fair and effective law enforcement,

knowledge of the law, and consistency between laws and institutional goals positively contributed to sustainability and effectiveness of marine resources conservation (Christie & White 2007). Community support for the development of regulations and policies of MPAs is therefore of crucial importance (Broad & Sanchirico 2008).

The prevailing argument by fishermen and other local actors relates to the difficulty to ensure compliance of regulations (Gelcich *et al.* 2005; Stump & Kriwoken 2006; Broad & Sanchirico 2008). Since regulations are frequently related to access rights and user restrictions, conflicts and lack of acceptance of MPAs generally exist. A recurring problem among fishermen is often associated with harmful fishing practices (Cinner & Pollnac 2004; Stump & Kriwoken 2006). An assessment of attitudes and perceptions to identify underlying causes of conflicts can assist to address issues and identify solutions that benefits both resource users and managers.

Statement of Problem

Conservation and development initiatives need to be adaptive and reconceptualized. The limited number of successful management strategies shows that mere community participation in the implementation phases is not sufficient as problems repeatedly arise such as, lack of acceptance of established protected areas, lack of compliance with regulations, and insufficient consideration of local opinions and perspectives. These issues frequently create conflicts and can largely be attributed to lack of awareness of existing differences in attitudes and perceptions of local stakeholders. Given that attitudes and perceptions towards marine resource management and existing regulations usually vary fundamentally, the “one-size-fits-all” approach to conserve marine resources is difficult to apply (Broad & Sanchirico 2008). In order for conservation efforts to be successful, there is a need to understand site-specific differences in people’s attitudes and perceptions. Additionally, variables to assess information are based on socio-cultural and economic characteristics between communities, resource utilization, and local

stakeholders' participation in decision-making processes. An examination of factors that influence attitudes and perceptions can be effective for resource managers to identify root causes of environmental problems, and can thereby target conservation and management activities to local conditions (Cinner & Pollnac 2004).

Purpose of Study

The main objective of this research was to evaluate residents' attitudes and perceptions of indigenous fishing communities towards marine resource use and current management practices. The aim was to provide a comprehensive understanding of the following issues: First, to identify differences in attitudes and perceptions of indigenous fishermen towards current marine resource management. Second, to examine awareness of existing regulations, and perceived level of compliance of local regulations that pertains to marine resource management.

Based on these objectives, the following *research questions* were formulated:

1. What are attitudes and perceptions towards marine resource management among small-scale fishermen in marine-dependent communities in Kuna Yala, Panama?
2. What are the levels of awareness of existing regulations and perceived problems of compliance?

To specifically assess differences in attitudes and perceptions, both research questions were further analyzed based on three variables: community, type of resource utilization, and local participation in decision-making.

Methods

Study Site

This research was conducted in the sovereign indigenous territory of Kuna Yala in northeastern Panama (see Figure 2-1). The territory encompasses 320,600 ha of continental rainforest and adjacent coastal waters with about 480 km of coastal zone in an extensive archipelago of over 360 islands (Guzman et al. 2003). The region's coral reefs are among the

best preserved and have the highest diversity of species in the Biogeographic Coast of the North West Atlantic (CODESTA 2005). The Kuna people live in 38 communities located on the islands, while another 11 communities are located in the coastal zones and in forested lands on the mainland. The current Kuna population is estimated to be approximately 50,000 people with 47% in Panama City and Colón, and 53% in Kuna Yala (Solis 2007, personal communication). The most drastic problems the Kuna currently experience are overpopulation, overfishing, and extraction of corals for building material (CODESTA 2005). In the past thirty years, living coral cover has declined by 79 % (Guzman *et al.* 2003). However, official legislation to control the extraction of corals does not exist. As a result, more than 50% of the coral reefs in the region are at risk of extinction (Guzman *et al.* 2003).

The research site is located in the mid-northeastern part of the Comarca. It comprises of six communities, Wargandup, Nargana, Akuanusadup, Digir, Tikantiki, and Maguebgandi, which are located in close proximity to one another and collectively form the administrative district of Nargana (see Figure 2-2). Several small protected areas have been established within the research area by the local organization Balu Uala, but lack management plans. They are in close proximity to the six communities with the sole objective to provide lobster refugee zones.

The area was selected for this study due to several unique features such as established local ownership, full local participation, and conservation and development strategies that are based on locally identified goals. The six communities collectively form the local association *Fuerza Unida de Seis Pueblos* (FUSPU), which is a 20 year old community-based institution. The association is united to effectively address environmental, cultural, socio-economic and political issues in the communities and to the *Congreso General Kuna* or General Kuna Congress (CGK), which is the highest political authority of the Kuna. FUSPU has identified short, medium and

long-term conservation and development goals based on local visions and needs. With the support of a locally-based private development organization (PDO), FUSPU has been implementing conservation efforts since 2003. The assistance they receive from the PDO is mostly in form of administrative and technical support, while goals and activities are locally defined and implemented.

Data Collection

Data were collected during June to July 2007 among residents in each of the six communities. Introductory meetings were held in each community with the respective village chiefs (*saila*) to explain the purpose of study and to ensure their consent. Core methods included collection of secondary data, in-depth interviews and unstructured interviews with key stakeholders, and participant observation. Thirty-two semi-structured interviews were conducted among participants who were identified and selected based on criterion and snowball sampling methods (Bernard 2000). The study population consisted of two stakeholder groups: Local stakeholders who participated in conservation and development projects coordinated by FUSPU (10 interviews), and local fishermen who were the primary user group of the marine resources (22 interviews). Some fishermen were marginally involved in the projects through voluntary participation in community meetings, while others were not involved in the projects. Three additional interviews were conducted with local key stakeholders who were knowledgeable in regional processes and respected members of their communities.

Instrumentation

The interview template was created in the Spanish language. All interviews were conducted in Spanish and Kuna with the help of a local translator. The translator accompanied every interview and ensured that even those interviewees who were fluent in the Spanish language could express their opinions and beliefs in the most detailed and comfortable manner.

The average length of duration for an interview was one to two hours. Each interview was immediately reviewed with the translator after conducting it to ensure that all information was captured and understood adequately. Each interview was later typed in the Spanish language to avoid data loss through translation.

The interviews comprised of four main sections (See Interview guide in Appendix A). In the first section, participants provided demographic and socio-economic information. This included information on age, community in which participants lived, household demographics, and years of education. Socio-economic information included occupation and main source of income. In the second section, respondents were asked about the types of marine activities they were engaged in, which included spatial information on fishing grounds, financial gains from marine resources, as well as types of catch and the portions used for sale and personal consumption. The third section asked for the participants' perceptions with respect to the overall conditions of marine resources, and their perception of threats, problems and solutions that affect the current marine resource management. This section further assessed participants' general attitudes towards successes and failures of the current marine resource management. In the fourth section, participants were asked for their knowledge of existing regulations of marine resource management, and their perception of the level of compliance with regulations. Each interview concluded with an option for additional comments. Interviewees were given pseudonym names to ensure personal confidentiality.

Data Analysis

Based on the research questions, data were segmented into two general themes:

1. General attitudes and perceptions towards current marine resource management
2. Awareness and perceptions of compliance with marine-related regulations

To assess *general attitudes and perceptions* of the study population, participants were asked to first describe the conditions of the water and marine life and the potential threats. Probing questions were asked that included their perception of problems that existed and possible solutions. Furthermore, they were asked to state successes and failures of the current marine resource management. All results were based on participants' responses; no pre-defined answer options were given.

Information on the level of knowledge with respect to *awareness and perceptions of compliance with existing regulations* was obtained by assessing access, use restrictions, and management of marine resources. Participants were asked to state if they knew of existing regulations of several marine use forms. These categories were predefined and included: "fishing", "lobster diving", "mangrove use", "coral use", "tourism", and "protected area". Variables were dichotomous with the values of *yes* and *no*. Each of these two main themes was further analyzed in terms of: a) community, b) resource utilization, and c) participation in local decision-making processes.

For analysis at the community-level, the six communities were grouped into two cultural categories, "traditional" and "westernized", based on the level of survival of local traditions. To assess differences in perceptions based on occupations, data were categorized into different levels of marine resource utilization. Since most people in Kuna Yala pursue two or three occupations simultaneously, it was not suitable to categorize the study population into divers, farmers or fishermen. Instead, categories were based on the main income source and were defined as:

- **Main income from marine resources (IMR):** Participants in this category have their main cash income derived from marine sources, especially fish and lobster. Secondary activities such as agriculture or retail sales may also be conducted but have less influence.

- **Main income from other sources (IOS):** Participants in this category use marine resources for subsistence purposes only, but their main income is derived from coconut harvest, agriculture, or other sources. Participants in this group do not dive for lobsters.

Local participation in decision-making processes was defined by participation in weekly village meetings in the local congress, follow-up on decisions of the General Kuna Congress, or participation in FUSPU meetings. Any one of these activities was noted as participation.

Differences were identified based on a three-point Likert scale that measured the level of participation in the three categories noted below:

- **No participation:** Participant does not take part in voluntary village meetings and shows no interest of involvement in resource management.
- **Moderate participation:** Participant occasionally participates in local meetings and generally follows decisions made regarding marine resource management.
- **Active participation:** Participant actively engages in local village meetings, FUSPU meetings and is well informed about local and regional processes related to conservation and use of the marine resources.

Primary data analysis followed the focused coding method. As a selective and conceptual method, focused coding enables the creation of categories to capture the data (Emerson 2001).

This method proved useful to capture the data from open-ended questions. Descriptive statistical analysis such as frequencies and cross-tabulation analyses was conducted using the SPSS program for all analysis.

Results

Profile of Participants

Interview participants represented inhabitants from all six communities (see Table. 3-1). All respondents (n=32) were male as fishing and marine use is an exclusively male activity. The largest group of respondents was 51-60 years of age (28.1%); the oldest respondent was 76 years old, the youngest was 21. Almost half of the respondents had primary education with six years of schooling or less (46.9%); the other half had some high school education (53.1%), and in one

case had a university education. Most respondents engaged in multiple activities to meet subsistence and economic needs. The primary work was agriculture (56.3%), while the primary source of income was lobster diving (40.6%). (See Table 3-2)

General Attitudes and Perceptions

Marine resource activities play an important role in Kuna livelihoods. Income generation and conservation were noted as most important (36.4%), followed by subsistence food source (22.7%). Only 5% noted that coastal waters were not important as they were farmers who mostly worked on the mainland (See Table 3-3).

A majority of respondents (90.9%) found the *overall conditions* of marine resources had changed. The decline of lobster (37.5%) and fish (25.0%) populations, increased numbers of divers and fishers (15.6%) and dying corals (9.4%) were noted as the main observed changes (see Table 3-4). The key identified *threats* (see Table 3-5) that influenced these changes were destructive fishing practices (58.1%) and the rapid increase of lobster divers (19.4%). Other causes identified included, the use of live coral for landfills (19.4%), and garbage in the water and on the islands (12.5%). Some respondents also believed the Kuna spiritual belief system played a role of being counterproductive to conservation, wherein plants and animals will never cease to exist (12.9%).

Several specific *problems* with the current marine resource management were also recognized. Noncompliance with regulations on marine resource use by many divers (68.2%) as a result of insufficient enforcement by the authorities (59.1%) was predominately mentioned. Further, participants felt a lack of communication and information with respect to marine management issues (36.4%), which resulted in lack of acceptance of the protected areas (31.8%). (See Table 3-6)

With respect to *solutions* to these problems, the need for more control and patrolling of the protected area waters (31%), and the creation of capacities such as education and awareness-raising measures (28.1%) were ranked the highest. Better information and communication about project proceedings (27.6%), decisions about regulations on marine management and respective actions and decisions of FUSPU were also frequently mentioned. These included changing the dates of the closed season¹ (20.7%) and the need for more financial transparency (12.5%) (See Table 3-7).

Attitudes and perceptions by community

The socio-cultural structure and economic development of the communities had a significant influence on people's perceptions and attitudes. Local ties are strong, and similarities in responses suggest that people discuss and debate marine issues within their community.

Tikantiki and Maguebgandi are the most traditional Kuna communities with the least infrastructure and lack any tourism activity. Overall, people from these two communities had very positive opinions about the protected areas. The closed season was discussed extensively, but more so in terms of time and season; the benefit of it was generally accepted.

During the veda the marine resources increase, which means that the veda works. Therefore a solution would be to introduce another veda, maybe from October to December, because I see that their number increases during that time which means that this is their reproductive cycle. (Jorge García, 29, Maguebgandi)

The veda should be changed to December until February, when there is no school and we have less spending for the kids. (Arcadio Martinez, 52, Tikantiki)

People in Maguebgandi seemed to be especially concerned about the lack of income alternatives and the exploitation of seafood. The inhabitants considered solutions with a practical approach that is strongly embedded in their social activities and livelihoods, such as changing

¹ In 1999 the Kuna General Congress established a closed season for seafood conservation called veda from March through May (Castillo & Lessios 2001). During this time lobster, conch and king crab may not be caught or sold.

dates of the closed season and creating a seafood farm. The other four communities of Wargandup, Akuanusadup, Nargana, and Digir showed a higher level of environmental awareness as respondents proposed solutions that directly targeted managerial issues. Higher exposure to tourism in Digir and the long presence of the Panamanian military in Nargana and Akuanusadup had altered the residents' perceptions about marine resource management. Most residents identified problems associated with the level of enforcement of regulations, protected area management and information management. Respondents proposed solutions in all four communities and included measures to increase capacities, such as enhancing awareness and education, improving communication and information, and increasing control mechanisms by patrolling restricted use areas.

Attitudes and perceptions by resource utilization

Most people pursue two or more different jobs (*pluriactivity*) (see Table 3-8). The majority of respondents (56.3%) stated agriculture as their primary profession. However, the main source of income was lobster diving (40.6%). Agriculture and fishing serve mainly subsistence purposes, whereas lobster diving was viewed purely as cash income. Almost 60% of the respondents derived their main income from marine resources (IMR). About 40% of respondents used the marine resources for subsistence purposes, but received their main income from other sources (IOS), such as agriculture, retail sales or tourism. The majority of both groups perceived destructive fishing practices to be the single most severe threat to marine life (75% IMR and 53% IOS), and consequently, both groups believed noncompliance with regulations as a major problem (40% IMR and 38.5% IOS):

The people don't follow the rules. The divers take out the little lobster, but the inspectors do not call them out, they accept small lobster. (Laureliano Ortega, 35, Tikantiki)

There are people who dive for lobster inside the protected areas, because there is no control and no one monitors them. This is a problem. (Héctor Castro, 54, Nargana)

The worry about lack of income alternatives (26.3% IMR and 15.4% IOS) was also recognized as a major issue in both groups. Visitor control was a problematic issue for 15.8% of the IMR group and for almost twice as many of the IOS group (30.8%). This could likely be an indication that tourism is indeed increasing in importance and accrues more problems without existence of appropriate control mechanisms.

Tourists and their yachts come without getting a permit. Nobody knows how many come. Sometimes we have over 20 yachts in one area at a time. They steal our coconuts which is our income. What is lacking is a way to control the tourists, to tell them what they can do and what they cannot do. I can't talk to them. They don't understand my language. (Simón Díaz, 67, Digir)

Problems mentioned by both user groups differed. They mainly focused on management issues² perceived by the IOS group and issues related to overfishing³ by the IMR group. Interestingly, 46.2% of the IOS group mentioned lack of acceptance of the protected areas by many people including divers as a problem, while only 10.5% of the IMR group found this to be an issue. This was somewhat unexpected as the lack of acceptance of the MPAs was thought to be higher among divers and fishermen as they are most affected by them.

Perceptions of potential solutions to these problems varied significantly among the two user groups. The most widely stated solution by the IMR group related to the closed season. Nearly 40% stated their wish to change the time of the closed season to different months or to add a second closed season to allow lobster more time to reproduce. Only 7.7% of the IOS group viewed changes in the closed season as a solution. Conversely, the IOS group primarily proposed better project leadership and more visual actions as ways to improve the current marine management. Only two similarities were detected, namely the need for more patrols and control

² Lack of visitor control, lack of information and communication, lack of regulation enforcement

³ Clandestine seafood sales, exploitation of seafood, lack of action, lack of awareness and education

mechanisms (31.6% IMR, 23.1% IOS), and creation of capacities such as raising awareness and education (38.9% IMR, 38.5% IOS). Overall perceptions showed that the protected areas were generally seen as a very positive measure for conservation purposes, as was the *veda* (closed season). Participants demonstrated the most negative attitudes towards specific management patterns such as enforcement of regulations and other control issues rather than the overall aims of conservation.

Attitudes and perceptions by local participation

Overall, those who actively participated in decision-making processes were more likely to have an opinion, positive as well as negative. They perceived threats or problems with marine resources more frequently; they were more critical of current marine management affairs and better informed about issues and problems (Table 3-9). The key problems identified were related to protected area management and overfishing (destructive fishing practices, noncompliance with regulations, lack of awareness and education, lack of income alternatives). Proposed solutions included the need to improve control mechanisms inside protected areas, patrol boats to manage tourism, the creation of capacities through specific seminars on marine protected area management, tourism management, and environmental education. Those who did not participate in decision-making predominantly noted information management, e.g. lack of action and continuity, lack of management of their concern and information.

Awareness and Perceptions of Existing Regulations

The introduction of western-style laws and restrictions is a recent development. A frequent comment regarding regulation of marine resource use was:

Little by little the regulations will come. In my generation nobody ever spoke of this. Before, we always broke up the live stones, for example to build the airstrip. These projects are new to us. Now there are buoys, *veda*, turtle fishing is prohibited, and there are inspectors to whom you have to present your lobster to see if it has the minimum size of 8 cm. (Prisciliano Escobar, 76, Akuanusadup)

Such comments likely lead to the assumption that conservation mechanisms have not been internalized by the Kuna people. Recurrent discussions of these issues suggest that most people perceive the necessity for these regulations, but it will likely take some time until they become fully accepted. Currently, official regulations only exist for lobster fishing⁴, tourism⁵, and other activities inside the protected areas⁶.

Perceived compliance with the regulations was a major problem. Overall, 68.4% of participants perceived that most people did not or only partly comply with the existing regulations on marine resources. Most frequently observed breaches included lobster diving inside protected areas, harvesting and selling juvenile and female lobster that carried eggs, and clandestine sales to tourists and intermediaries. Participants perceived the main problematic group to be adolescent divers who did not pursue other types of work and were more dependent on lobster than others who also worked in farming. This group was viewed to be most problematic as they showed no respect for regulations.

The main problems are destruction of the live stones to reach the lobster, and harvest of juveniles and females. From all this you can see that those [young] divers don't care, they only think about themselves and about money. Many [of them] don't like the protected area. They say that the sea is free for everyone and they want to dive wherever they want. (Gilberto Ossa 37, Wargandup)

Participants frequently noted the need for better control mechanisms such as patrol boats to address the problem. Other recommendations suggested included lobster diver education⁷, and better training for inspectors.

⁴ Closed season, 8 cm minimum carcass length for lobster, prohibition to catch females that carry eggs

⁵ Tourism regulations only exist in Digir and are purely community-based

⁶ Only artisanal fishing is allowed inside the protected areas; diving for lobster is prohibited

⁷ Mostly mentioned in Digir

Awareness and perceptions of regulations by community

Rules to regulate lobster fishing and the protected areas were well known throughout the area. About 85.7% of respondents in five communities (not including Maguebgandi) were aware that regulations existed on lobster fishing, and 82.1% of respondents (not including Maguebgandi) were aware that protected areas were regulated (Table 3-10). Maguebgandi is an extreme case and was therefore excluded. This remotely located community demonstrated a different perspective; none of the participants mentioned any knowledge of regulations in any of the categories provided. A plausible explanation was given by one of the respondents from Maguebgandi:

Here in Maguebgandi we are too far away from the other communities. We don't have rules for the marine resources here. (Paulino Lopez, 34, Maguebgandi)

Tourism-related regulations in Tikantiki and Maguebgandi were largely not discussed as tourism was not evident in either of these communities. Tourism is currently only regulated in Digir. About 72.2% of respondents from Digir stated knowledge of such regulations, while the remaining 27.3% were not aware of tourism-related regulations. Results suggest that regulations were likely not well communicated. Moreover, mangroves and corals were not officially managed, but a significant number of respondents believed that mangrove and coral extraction were regulated.

Awareness and perceptions of regulations by resource utilization

Regulations for lobster fishing and protected area use were generally well known, regardless of the intensity of marine resource use. However, 92.3% of the IOS group correctly stated the existence of lobster regulations, while only 63.2% of the primary fishermen knew of such rules. This could be explained by misunderstandings, whereby the closed season might not have been perceived as a regulation. However, it is likely that those who did have an income

alternative to lobster harvest more likely accepted the existing regulations. Both the protected area and the closed season stirred much discussion among the people. Results demonstrate that those who were engaged in tourism and retail sales were generally more aware of the existing regulations (Table 3-11).

Perceptions of regulations by local participation

Knowledge of existing policies on marine resource use appeared to be better known among those who were actively involved in local decision-making processes. Correct answers (lobster diving, tourism, protected area) were mostly given by those who regularly participated in local political or managerial affairs. The results showed a gradual increase in knowledge of rules based on the level of participation (see Table 3-12). Tourism was frequently treated as generally regulated. The results showed the same gradual increase in knowledge of such regulations. Results suggest that tourism was extensively discussed in village meetings. The sailas (village chiefs) were generally actively participative and were supposed to enforce the established rules. However, a recurring problem existed whereby rhetoric exercised during the communal meetings was not always followed by action, as one respondent stated:

The Congress prohibited killing turtles. The sailas applauded but nothing happened.
(Héctor Castro, 54, Akuanusadup)

Discussion

General Perceptions

Overall, the protected areas in the research site were perceived to be very positive. Although there is no official recognition by the national government or international institutions such as IUCN, therefore all regulative mechanisms have been created by the local authorities. This process has created a stronger sense of ownership and empowerment, which could have contributed to the overall acceptance of regulations (Brown 2003). The key issues mentioned in

the six communities were mostly associated with human-induced processes, and not related to natural events such as hurricanes, floods, or species fluctuations (Mora 2007). Similarly to previous research, harmful fishing practices were perceived as the most serious threats to marine life (Cinner & Pollnac 2004; Stump & Kriwoken 2006). Such practices included, fishing of juvenile lobster and of females that carry eggs, and destructive techniques to draw them out of their caves, i.e, breaking the rock and spraying of Clorox bleach into lobster caves.

There was also general awareness that the lobster population was decreasing at an alarming rate. It was a common belief that the time for the closed season was chosen based on the lobsters' reproductive cycle. However, researchers have found that lobster reproduce year-round (Castillo & Lessios 2001). Findings suggested that there seemed to be quite a bit of confusion with regards to regulations. People were unsure as to which marine resources were officially regulated.

Community: This research supports findings in the literature about the common misperception that communities – especially indigenous cultures – are homogenous, i.e, a community is viewed as one unit with certain attitudes and beliefs (Agrawal & Gibson, 1999). Similar to other studies that have assessed community perceptions and attitudes (Gelcich *et al.* 2005; Broad & Sanchirico 2008), this study found significant differences between communities with regards to socio-economic differences such as exposure to tourism activities. Findings in this study differ from other studies whereby differences in attitudes were based on other factors, such as wealth and education (Cinner & Pollnac 2004). Instead, the level of traditional Kuna livelihood as practiced in the communities had a significant influence on people's perceptions and attitudes.

Occupation: Differences in attitudes among seemingly homogeneous groups such as fishermen can lead to conflicts (McClanahan *et al.* 2005; Stump & Kriwoken 2006). At times, these can turn into violent actions if a situation escalates due to either, misunderstandings, lack of information and trust, or lack of knowledge of underlying concerns of different stakeholder groups (Heylings & Cruz 1998; Macdonald 1997). Therefore, the heterogeneity of stakeholder attitudes must be considered in the planning and development of conservation-related activities (Gelcich *et al.* 2005). This study found highly important differences in fishermen's attitudes towards marine resource management that can be of crucial importance for future management strategies. Conflicts with respect to the protected areas in Kuna Yala have begun to include violent actions. Six hand-painted signs indicating a conservation area with restricted resource use were set up at each of the designated protected areas within the research area (see Figure 3-1). However, within three weeks five of the six signs were torn down. No one seemed to know the culprit, but most people agreed that it was likely the group of young lobster fishermen who were the strongest opponents of the protected areas as they perceived their access restricted.

Participation: Projects often failed where local and indigenous communities were not included in decision-making and development phases (Garnett *et al.* 2007; Salafsky *et al.* 2001). Findings showed that participation in local processes affected recognition and knowledge of issues related to marine resources. Active participation is likely to have a great impact on people's perceptions. Those who were involved in local processes were more knowledgeable of regulations and more likely to have critical opinions on marine resource management. Participation encouraged action among fishermen to debate solutions with respect to compliance issues, lack of income alternatives, and overfishing. As a result, resident fishermen from Digir decided to create a cooperative of lobster divers which was proudly elaborated during several

interviews. People in Digir were accustomed to being actively engaged in local initiatives through their long experience with community-based tourism. Such action creates a sense of ownership and pride for the home region (Pomeroy *et al.* 1997).

Compliance: Results of previous studies (Cinner & Pollnac 2004; Gelcich *et al.* 2005; Stump & Kriwoken 2006; Broad & Sanchirico 2008) are supported in that compliance issues with existing regulations are a major problem. Respondents believed that only about one third of all fishermen in the six communities fully complied with the existing regulations. Participants mostly blamed a subgroup of adolescent Kuna fishermen who committed themselves exclusively to lobster diving and largely disrespected regulations. Several fishermen stated that this group perceived lobster fishing as a sport and did not respect the closed season or fishing restrictions inside the protected areas. Apart from this subgroup, participants were generally concerned about the limited alternatives for generating income. During the closed season, this opportunity for income was not available. Several participants stated that the closed season coincided with the beginning of the new school year, when the necessity for money is greater because of the need to buy school supplies for their children. The lack of incentives, such as different livelihood options to generate this needed income, could imply the persistence of harmful or illegal fishing techniques, and thus the lack of compliance with existing regulations (McConney & Baldeo 2007).

Implications and Recommendations

Based on the findings of this study, several recommendations can be identified and generalized. First, differences between communities and people of similar professions suggest that attitudes and perceptions of local resource users and stakeholders can be identified prior to the development and implementation of a management strategy. This is to ensure that areas of concern and differences in priorities such as lack of income alternatives and restricted access to

the resource can be targeted appropriately in the creation of management strategies. A baseline assessment such as the one that is recommended by the Convention on Biological Diversity (CBD) can provide the foundation of the information and can be adjusted to regional needs (CBD 2004).

Second, based on the baseline information, capacity-building measures such as education and training should be targeted to the different audiences and stakeholder groups that were identified. Capacity-building and environmental awareness are one option to create an understanding of the need to conserve. However, “one-size-fits-all” approaches to capacity-building run the risk of not targeting all stakeholder groups. Discussion or focus groups that represent the broad spectrum of opinions can help to further clarify conflict areas and identify incentives or other means to reach a solution that benefits all parties. The highest individual capacities in this study were found in those communities with higher exposure to tourism and in which several capacity-building workshops were conducted in 2005. Capacity-building enables higher levels of participation and thereby fosters the sense for local ownership and empowerment which can lead to the development of responsibility for the resource of concern and thereby to increasing care for its protection.

Third, conflicts need to be resolved or avoided if possible. This can be achieved through specifically targeted capacity-building and by inclusion of local stakeholders in decision-making and planning processes from the beginning. The case of the Kuna showed that locally-based conservation and development initiatives can be very successful. Outside support should be limited to the needs of the respective community and provided in the form of technical, administrative, or managerial support, if needed.

Fourth, projects should be targeted to create visual outputs in relative short periods of time to keep local people encouraged to participate. About 18% of the participants found lack of action and continuity in the projects to be a problem, and 12.5% proposed more visual actions as a solution to the general managerial problems. One of several small-scale tourism-related conservation and development projects did aim to provide visual results. The project had the aim to show people that “conservation pays” while at the same time improving visitor management. Island owners were encouraged to keep their beaches clean from garbage and in return received US\$ 2 entrance fee per day for each visitor. With the help from the private development organization this was relatively feasible to set up and results were visible within six months (see Figure 3-5).

Fifth, conservation projects should be small in both spatial and temporal scale. When initial phases take up too much time without producing visual outputs, people become disillusioned and lose interest. Local stakeholders must be able to see that their efforts are being successful. Many people in Kuna Yala were frustrated with a perceived lack of action and continuity, where they did not see immediate or obvious results of the project. To provide such visual outputs, a series of small-scale projects instead of one large project proved successful. If projects follow previously defined short, medium and long-term goals and objectives, which should be identified by local stakeholder groups, then each mini-project can incorporate some form of visual results to demonstrate that their efforts are being paid off (Horwich & Lyon 2007).

Conclusions

Integration of local and indigenous communities in conservation and development projects is complex. Redford and Sanderson (2000) argued that indigenous people should have the liberty to decide upon the management of their lands and resources. However, often local and

indigenous communities lack the necessary technical and administrative knowledge. Therefore it is important to find an amicable solution that allows local communities in pristine areas to manage resources based on their own cultural standards, but also provide for an opportunity to support their goals and objectives if they seek it.

This research provided a step in this direction. The main objective was to identify perceptions, attitudes, and behavioral patterns of local fishermen in order to assess their ability and knowledge with regards to marine resource management. The results indicate that there are significant differences in people's opinions and perceptions of current problems associated with marine resource use and management. The study showed that communities are heterogeneous and should not be approached as one unit; instead, multiple actors and opinions are present which need to be respected. This should be taken into account for all conservation-related activities. Stakeholders should also not be grouped based on their profession (e.g. "lobster divers", or "fishermen"). The study revealed that attitudes and behaviors of people differ according to their level of marine resource use and not by a certain profession. Participation in decision-making processes, even if only at the community-level showed to have positive effects on people's awareness and knowledge of marine issues such as conservation and management, tourism, and information management. The results support the literature on the importance of local participation in conservation and development activities.

Community-based ownership and decision-making authority can be realized. Creating capacities at the individual and institutional level are important cornerstones for implementing this approach to community-based conservation and development. Assessment of perceptions and attitudes of those affected is absolutely essential in order to identify areas of conflict, acceptance or decline of certain practices, and to gain insight into certain behavioral patterns.

Based on such a foundation of baseline information, capacity-building measures can be targeted more effectively toward different stakeholder groups, address areas of concern to the people and ensure that all different stakeholder groups get involved. Capacity-building measures should encourage more people to actively participate in processes with regards to their community. Such measures should in addition provide local people with the technical and administrative knowledge to realize their visions and goals. This approach needs to be further tested in the field to evaluate its effectiveness in other geographic settings.

Table 3-1. Sample size of study population

Community	Population	No of Participants	
		Freq	%
Wargandup	440	6	18.8
Akuanusadup	370	4	12.5
Nargana	605	4	12.5
Digir	889	9	28.1
Tikantiki	890	5	15.6
Maguebgandi	207	4	12.5

Table 3-2. Demographic characteristics of study population

Age group	(%)	Education level	(%)	Occupation	% primary work	% main income
<20	0	1-3 y	6.3	Lobster diving	21.9	40.6
21-30	9.4	4-6 y	40.6	Fishing	9.4	18.8
31-40	18.8	7-9 y	31.2	Agriculture	56.3	18.8
41-50	15.6	10-12 y	18.8	Retail	0	9.4
51-60	28.1	university level	3.1	Retired	3.1	3.1
61-70	15.6			Other	9.4	9.4
>70	12.5					

Table 3-3. Importance of marine resources to people

Importance of marine resources	(%)
Conservation	36.4
Income Generation	36.4
Food Source	22.7
No importance	4.5

Table 3-4. Perception of change of marine conditions

Have conditions changed?	(%)	How have they changed?	(%)
Yes	90.9	Less lobster	37.5
No	9.1	Less fish	25.0
		More fishermen	15.6
		Corals dying	9.4
		Other	6.2

Table 3-5. Threats to marine resources

Threats to marine resources		(%)
1	Destructive fishing practices	58.1
2	Too many lobster divers	19.4
3	Landfills with live coral	19.4
4	Kuna cosmovision	12.9
5	Garbage in water and on land	12.5
6	Gasoline	3.2
7	No threats	21.9

Table.3-6. Identified problems with current marine resource management

Problems of current marine resource management		(%)
1	Noncompliance with existing regulations	68.2
2	No enforcement of rules	59.1
3	Lack of information and communication	36.4
4	Lack of acceptance of PA	31.8
5	Lack of income alternatives	27.3
6	Exploitation of seafood	27.3
7	Lack of visitor control	22.7
8	Lack of awareness and education	22.7
9	Lack of action and continuity	18.2
10	Clandestine sales of seafood	13.6
11	Lack of waste management	9.1
12	People do not voice their concern	9.1
13	Large protected areas lead to problems	4.5
14	Other	13.6

Table 3-7. Identified solutions to improve marine resource management

Identified solutions to problems		(%)
1	More control and patrolling	31.0
2	Create capacities: education + awareness	28.1
3	Change or add veda	27.6
4	Better information and communication	27.6
5	Develop better rules and regulations	20.7
6	Provide more visual actions and transparency	12.5
7	Controlled/limited use of fishing grounds	14.3
8	Create income alternatives and monetary incentives	9.4
9	More information for tourists	6.9
10	Better leadership in the RPMK project	6.9
11	Form lobster cooperative	6.9
12	Create seafood farm to counteract overfishing	3.1
13	More dedication and enthusiasm	3.1
14	Other	15.6

Table 3-8. Pluriactivity of respondents

Type of work	% primary work	% secondary work	% main source of income
Fishing	9.4	37.5	18.8
Lobster diving	21.9	15.6	40.6
Agriculture*	56.3	15.6	18.8
Retail sales	0	3.1	9.4
Retirement	3.1	0	3.1
Other	9.4	3.1	9.4

*The Kuna mainly grow yucca, pineapple, and coconuts. Coconuts have the largest financial value of US \$0.12 a piece

Table 3-9. Participation in decision-making processes

Level of participation	Protected area		Signs		Veda		FUSPU and project		Tourism activities		Control of divers
	%pos	%neg	%pos	%neg	%pos	%neg	%pos	%neg	%pos	%neg	%neg
none	69.2	0	7.7	0	53.8	15.4	7.7	7.7	0	7.7	0
moderate	75	0	12.5	0	12.5	0	25	37.5	0	25	62.5
active	40	10	10	10	40	10	0	30	10	10	20

Table 3-10. Knowledge of regulations by community

	Fishing (%)	Diving (%)	Mangrove use (%)	Coral use (%)	Tourism (%)	Protected area (%)
Wargandup	16.7	83.3	33.3	33.3	66.7	33.3
Akuanusadup	25	75	0	0	75	100
Nargana	50	100	80.4	44.5	50	100
Digir	18.2	90.9	9.1	63.6	72.7	90.9
Tikantiki	40	80	80	100	20	100
Maguebgandi	0	0	0	0	0	0
TOTAL %	25.0%	85.7%	32.1%	53.6%	60.7%	82.1%

Table 3-11. Knowledge of regulations by resource utilization

	% Main income from marine resources (IMR)	% Main income from other sources (IOS)
Fishing	21.1	23.1
Diving*	63.2	92.3
Mangrove use	26.3	30.8
Coral use	36.8	61.5
Tourism*	42.1	69.2
Protected area*	68.4	76.9

*These categories currently are regulated

Table 3-12. Knowledge of regulations by participation

	No participation (%)	Moderate participation (%)	Active participation (%)
Fishing	7.1	50	20
Diving	57.1	87.5	90
Mangrove use	21.4	50	20
Coral use	35.7	62.5	50
Tourism	35.7	62.5	70
Protected area	64.3	75	80



Figure 3-1. Hand-painted signs indicating marine conservation areas



A



B

Figure 3-2. Before and after the beach cleaning project: A shows the beach before the owner of the island joined the project; B shows the beach of a different island after joining the project.

CHAPTER 4 CONCLUSION

This paper examined socio-economic indicators and factors that influence perceptions of local marine resource use among residents of six indigenous fishing villages in Kuna Yala, Panama. The study consisted of two approaches: The first part assessed socio-economic baseline information to provide an overview of demographic, social, cultural, economic, and legal aspects that pertain to natural resource management and livelihood characters of Kuna fishermen. Based on this, an in-depth analysis was conducted to assess perceptions and attitudes of fishermen in order to analyze local opinions, conservation priorities, and areas of conflict in the research area.

Main findings of this research overall suggest that the importance of assessing baseline information and local perceptions in conservation and development projects is still largely underestimated. Socioeconomic baseline information can be used as part of an ongoing monitoring program, rather than a one-time assessment. Thereby, it can identify trends and changes in community and household demographic and economic characteristics, coastal activities, and people's perceptions about coastal and community issues. Even if this information were only collected to provide a preliminary one-shot assessment of a local community and its interactions with natural resources, it could help target conservation measures more specifically and adjust them to local circumstances. However, a complete assessment of the local situation cannot be achieved without in-depth analysis of community perceptions, attitudes, and related behavior patterns regarding resource use.

As the second part of this study found, understanding the perceptions and attitudes of different stakeholder groups within an area can help understand the responses of the groups to existing policies or activities. In natural resource management, there are often widespread differences in perceptions of local conditions (Gelcich *et al.* 2005). Verification of these

differences can help mitigate conflicts and create a common understanding of issues of concern among local residents. Especially with regard to issues related compliance with regulations, knowing why certain people reject management strategies can help finding solutions to the problem.

To be able to target any conservation and development initiative to local circumstances and priorities, an assessment of such information is a crucial starting point. True partnership in conservation begins with sharing of information and thereby creating trust. If stakeholder concerns are identified and taken into consideration when developing conservation-related activities, conservation measures can be designed as part of local livelihoods and woven into the local culture. However, it is important that local actors are accepted as the main drivers of these initiatives. This is an important aspect for long-term success of conservation and development. The case of the Kuna showed that local ownership in project development and implementation is possible, and that indigenous people are capable of designing their own conservation strategies. Outside support is encouraged but should be limited to technical or administrative knowledge.

APPENDIX A
INTERVIEW GUIDE

Interview questions	Answer categories	Open-ended comments
Interview number		
Section I: Demographic		
Age of interview partner	0-20, 21-30, 31-40, 41-50, 51-60, 61-70, 71+	
Which community do you live in?		
How many people live in your household?		
How many of the household members are adults?		
How many of the household members are children?		
How many years of education have you had?	1-3 years, 4-6 years, 7-9 years, 10-12 years, university level, none	
How many years of education has your wife had?	1-3 years, 4-6 years, 7-9 years, 10-12 years, university level, none	
Socio-economic		
What is your primary profession?	lobster diving, fishing, agriculture, coconut harvest, retail sales, retired, other	
What is your secondary profession?	lobster diving, fishing, agriculture, coconut harvest, retail sales, retired, other	
What is your wife's main profession?	housewife, teacher, agriculture, health care center, retail, other	
What is your main source of income?	lobster diving, fishing, agriculture, coconut harvest, retail sales, retired, other	
What kind of importance do the marine resources have for you?	conservation, income generation, food source, no importance	open-ended
Section II: Marine Activities		
What marine activities do you engage in?	lobster diving, fishing	
What type of seafood do you catch?	Red Snapper, grouper, grunt, yellowtail snapper, squirrelfish, etc	
How much time do you spend per day/week for these activities?	2, 3, 4 times per week, daily, once a week, 3 hrs per day, etc.	
What is the financial value of	in \$/day or in \$/lb (for lobster)	

your catch per day/week?		
What do you use it for?	sale, consumption	
What fishing / diving locations do you use?	named islands and areas, mostly through landmarks	
When do you go out to fish or dive throughout the year?	permanently, seasonal, summer, winter	
What types of fish do you catch at the locations you go to?	Red Snapper, grouper, grunt, yellowtail snapper, squirrelfish, etc	
What quantity do you catch per day?	in lb	
In comparison to today, what quantities and financial values did you make 10 years ago?		open-ended
Section III: Environmental Perceptions		
How do you perceive the conditions of the marine resources?	very poor, poor, neither good nor poor, good, very good	
In your opinion, have the conditions changed over the past 5-10 years?	yes, no	
If yes, how have the conditions changed?	less lobster, less fish, more divers, corals dying, other	open-ended
In your opinion, what are the main threats that affect the health conditions of the marine resources?	destructive fishing practices, too many divers, garbage, noncompliance of regulations, land filling with live coral, change of culture, uninformed tourists, dependence on tourism, gasoline that gets into the water, no threats, invalid answer	open-ended
Apart from the threats, what would you say are the main problems the current marine resource management is facing?	noncompliance with regulations, no enforcement of rules, lack of acceptance of PA and RPMK, lack of info and communication, lack of visitor control, lack of awareness and education, clandestine seafood sales, lack of action and continuity, lack of income alternatives, no waste management, no voicing of concern, commercialization leads to exploitation, large PAs cause problems, no problems	open-ended
What solutions to these problems would you identify?	more control and patrolling, change veda, better communication and information, develop rules and regulations, more info for tourists, stronger leadership in project, lobster diver cooperative, collect garbage, create seafood farm, visual actions, agriculture as income alternative, monetary incentives to counteract illegal	open-ended

	fishing, no solutions	
In your opinion, what successes could you identify, if any, in the current marine resource management?	PA, veda, kayak tourism, FUSPU and project, no success, no answer	open-ended
In your opinion, what failures, if any, could you identify in the current marine resource management?	visitor control, control of divers, communication, signs, PA, FUSPU and project, no failure, no answer	open-ended
Section IV: Participation and Knowledge		
On a scale from 1-3, to what level do you participate in decision-making processes?	no participation, moderate participation, active participation	
Are you satisfied with your current level of participation?	yes, no	
Do you know of rules and regulations concerning fishing?	yes, no	
Do you know of rules and regulations concerning lobster diving?	yes, no	
Do you know of rules and regulations concerning mangrove use?	yes, no	
Do you know of rules and regulations concerning coral use?	yes, no	
Do you know of rules and regulations concerning tourism?	yes, no	
Do you know of rules and regulations concerning the Protected Area?	yes, no	
In your opinion, to what extent to the people in general comply with the existing regulations?	no compliance, partial compliance, full compliance	

APPENDIX B
CRITERIA FOR BASELINE ASSESSMENT

Population demographics	
Available data	Missing data
Population	Migration rate (only for Nargana and Akuanusadup)
Gender	Literacy
Age	Religion
Number of households	Household income
Household size	Health status of the community
Education	
Language (how many speak Kuna and Spanish)	
Occupation	
Community infrastructure and business development	
Economic activities	
Available data	Missing data
Coastal and Marine Activities	Level of use by outsiders (lobster fishing by tourists)
Goods and services	Complete tourism profile
Types of use	Tourism income and expenditure
Use patterns	
Value of goods and services	
Goods and services market orientation	
Levels and types of impact	
Traditional systems	
Coconut harvest	
Economic significance	
Tourist profile	
Types of activities	
Details of visitation (numbers and types of tourists, lengths of visits, main Periods of visitation (daily, seasonally))	
Socio-Cultural aspects	
Available data	Missing data
Gender roles	Culturally sensitive areas (including historical and archaeological sites)
Cultural heritage including spiritual belief systems	Complete spiritual belief system
Governance	
Available data	Missing data
Community and stakeholder organizations	Management plan (when ready)
Stakeholder participation	Informal tenure and rules, customs and traditions
All information on land ownership, land rights of local residents	
Enabling legislation	

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BIOGRAPHICAL SKETCH

Stefanie Hoehn was born in Recklinghausen, Germany, and spent much of her free time traveling throughout Europe, Latin America, and Africa. In 2004, she graduated with a diploma degree in applied geography with a concentration in tourism geography from the University of Trier, Germany. During and after completing her degree, Stefanie served as Assistant Project Manager for the nongovernmental organization Ecological Tourism in Europe (ETE) for four years. There she was in charge of their projects on biodiversity conservation and sustainable tourism development across Central and Eastern Europe, with special focus on implementing the objectives of the Convention on Biological Diversity (CBD). Her time working in this field inspired her to pursue a master's degree, and she began working toward her Master of Arts in 2006 in Latin American Studies with a concentration in Tropical Conservation and Development.