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Reversing the Degradation of Mangroves
in the Caribbean and Philippines

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ABSTRACT

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Mangrove forests are important coastal ecosystems that have been degraded and destroyed throughout the tropics. Two projects are examined--one from the Caribbean and one from the Philippines--that are attempting to halt the degradation of critical mangrove sites. Experience revealed several key compounding factors that hindered resource conservation in both cases. For one, there has been a tendency to undervalue mangroves, in terms of their critical ecological functions as well as their direct production values to local populations. A corollary of this is a failure to acknowledge and incorporate less visible but nonetheless significant resource users and interest groups in mangrove planning and management. In addition, the unusual ecology and diverse resource values have contributed to ambiguous tenure and administrative arrangements over mangrove areas. Efforts to restore and protect the Caribbean and Philippine mangrove sites have had to address all of these factors. In particular, project work has tried to harmonise the interests of local resource users and various levels of government with the intent of establishing meaningful and lasting co-management systems. Both communal and household (private)-based strategies have been used with some success, although the shortcomings of each are also apparent and discussed.

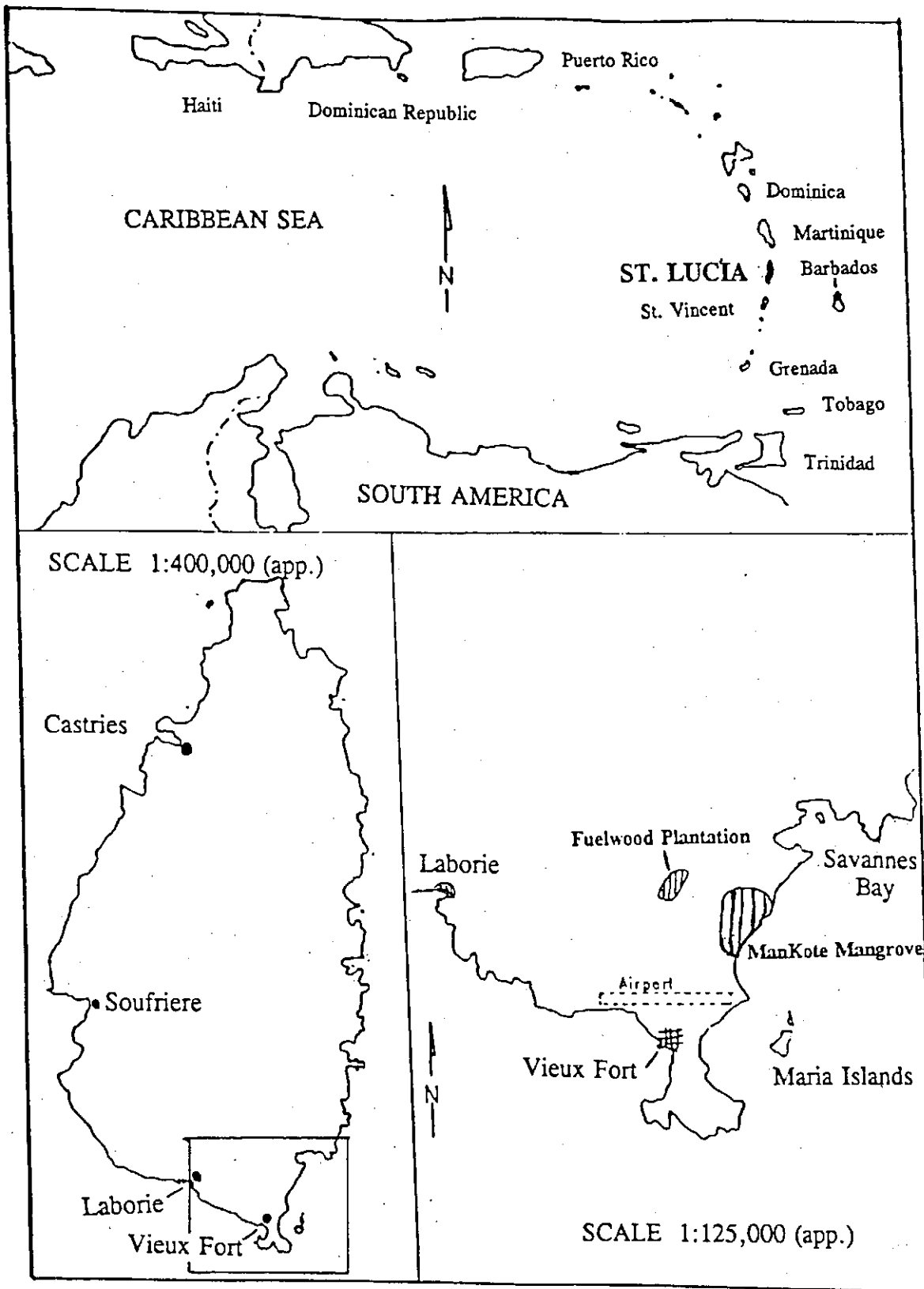


Figure 1. Location of the ManKote Mangrove, St. Lucia, West Indies

1.0 INTRODUCTION

Mangroves are highly productive coastal forest ecosystems that provide many important economic and ecological benefits to local and regional populations (Dugan, 1990; Hamilton and Snedacker, 1984; Jara, 1985; Ruitenbeek, 1992). Their widespread destruction and degradation throughout the tropics results in impaired ecological functions and reduced economic opportunities for many marginal people who depend directly on mangrove resources to meet their basic needs and derive working incomes (Jara, 1985).

Being both land and sea, mangroves pose special problems and create unique opportunities for conservation. This paper examines two case studies of mangrove conservation work, one from the Eastern Caribbean and one from the Philippines. Each has attempted to establish a greater degree of local user involvement or co-management in efforts aimed at restoring and protecting the sites. The experiences of each are reviewed and then analyzed in terms of common issues that appear to confront mangrove conservation in general.

2.0 DESCRIPTION AND OVERVIEW OF PROJECTS

2.1 Mankote, St. Lucia

Site Description

The 40 ha Mankote mangrove is found on the south-east coast of St. Lucia, one of the Windward Islands of the Eastern Caribbean (Figure 1). Mankote is a basin-type mangrove that is open to direct tidal exchange with the sea for only five or so months of the year. The remainder of the year it is separated from the sea by a barrier beach. Four tree species predominate in the mangrove: *Laguncularia racemosa*, *Rhizophora mangle*, *Avicennia germinans* and *Canocarpus erecta* (Smith and Berkes, in press).

Mangroves are relatively uncommon along the coasts of exposed, oceanic islands like St. Lucia. Therefore, although small by continental standards, the Mankote site is the single largest mangrove forest in the country and one of the largest in the Caribbean Lesser Antilles Region (Walters and Burt, 1991b). For this reason it was identified in 1982 as a regional priority for conservation (ECNAMP, 1983).

Tenure History and Resource Use Patterns

The Mankote mangrove was held under private ownership as part of a large sugar estate for over a century until the Second World War. During the plantation period, wood from the mangrove was cut for local use in the plantation and for export to the neighbouring

island of Barbados. The sugar plantation lands, including the mangrove, were leased to the U.S. military in 1941 for use as an air base (Walters and Burt, 1991a). Access to the area was highly restricted once the Americans established their presence in the area and much of the mangrove was allowed to regenerate. The base lands, including the mangrove, were transferred to the National Government of St. Lucia following the U.S. military withdrawal from the area in 1960.

The highly restricted access enforced by the U.S. military rapidly gave way to increasingly open access conditions once the lands were transferred to the national government. The Mankote mangrove, in particular, fell under intensive pressure from locals who used the area for making charcoal, fishing, crab collecting, livestock grazing, bird hunting, garbage dumping and therapeutic bathing (see Table 1) (Smith and Berkes, in press; Walters and Burt, 1991a).¹

Charcoal making, in particular, has been important to the local economy and has had a major impact on the mangrove in recent years. Since the early 1980's about twelve small-scale producers, on average, have derived their primary incomes from the mangrove, which supplies most of the charcoal needs for the neighbouring town of Vieux Fort and the overall south-east coast region (Figure 1) (Walters and Burt, 1991a). Fishing in the mangrove is done using a variety of traditional methods to capture brackish water species, especially during the dry season when the interior waters of the mangrove are closed off from the sea. Although intensive, fishing is mostly limited to the few hectares of deeper, open waters found near the centre of the mangrove.

Government agencies in St. Lucia with administrative or management authority for mangrove resources have differed sharply in their policies towards the mangrove. For example, the Ministry of Health with permission from the National Development Corporation² began in 1980 to spray and clear the mangrove as part of a mosquito eradication program intended to make the neighbouring resort areas more comfortable for tourists. The National Trust (the national heritage agency) and the Department of Fisheries, on the other hand, were promoting the concept of protecting the mangrove as an intact reserve. But despite these differences, all government agencies shared in common a general ignorance and neglect of the interests of local residents in the resource. In fact, the policies of the various government agencies contributed

¹ There has also been some commercial interest in recent years to convert the entire site to a marina or golf course.

² The National Development Corporation is responsible for the disposal and development of public lands designated for commercial and residential use.

to the local peoples' concern that they would eventually be deprived of access to the area. The effect was to promote abuse and neglect of the mangrove by those who could obtain short-term benefit from it. By the early 1980's, the mangrove was highly degraded and becoming worse so by the year (Walters and Burt, 1991b).

Table 1. Summary of important values associated with the Mankote and Talabong mangrove forests. Values are identified in each case and ranked as to their relative importance, according to the following: +++ = very important; ++ = important; + = present but unimportant; - = not present; ? = unknown if present.

VALUES	Mankote, St. Lucia	Talabong, Philippines
I. PRODUCTS		
fuelwood/charcoal	+++	+++
construction materials	+	++
fishing*	++	+++
crustaceans	++	++
molluscs	?	+++
wildlife hunting	+	+
livestock forage	+	++
bark/nipa/medicines	?	++
refuse dump	++	+
propagule source	+	++
settlement site	-	+
therapeutic baths	++	?
II. FUNCTIONS		
spawning/nursery	+	+++
biomass export	+	+++
wildlife sanctuary	++	+++
storm protection	+	++
shore stabilisation	+	++
pollution protection	+	++
recreation/tourism	++	+

* Includes fishing within and near the periphery of the mangrove (for mangrove-dependant species).

Project Summary

The Caribbean Natural Resources Institute (CANARI)³ viewed the Mankote as an ideal opportunity for applying a community-based, co-management strategy for conserving the mangrove. In 1983 it began consultations with the key local mangrove users, the charcoal makers, and the relevant government agencies. The charcoal makers have been organised as a means to encourage collective management of the mangrove resource. Existing cutting techniques that encourage conservation have been strengthened.⁴ In particular, individual cutting rights based on informal territorial claims have been recognised by the project as the basis for management of the fuelwood resources within the mangrove. Evidence strongly suggests that secure tenure rights appear to have been a crucial factor leading to the adoption of better management practices over time by the charcoal makers (Smith and Berkes, in press). The mangrove continues today to be harvested intensively, but cutting appears to be sustainable and destructive practices like garbage dumping have largely been stopped as a result of internal community pressures (Smith and Berkes, 1990; Walters and Burt, 1991b).

The charcoal makers' organisation has also been provided with a lease to 10 hectares of neighbouring government lands to pursue other income-generating activities in order to reduce the cutting pressure on the mangrove over the long term. In particular, the charcoal makers have cleared several hectares for farming and the Department of Forestry, the National Development Corporation and charcoal makers organisation have established and now co-manage a small plantation of *Leucaena leucocephala* as an alternative source of charcoal wood to the mangrove (Walters and Burt, 1991a, 1991b).

In contrast to the Philippines (see below), St. Lucia lacks the kinds of policies and legislation that favour local control of resources like mangroves. As a result, CANARI has had to start from scratch in its dealings with government. Considerable progress has been made in establishing shared management between the government (Department of Forestry and National Development Corporation) and the charcoal makers for the *Leucaena* fuelwood plantation (Walters and Burt, 1991a and 1991b). Likewise, the work

³ CANARI, formerly the Eastern Caribbean Natural Areas Management Program (ECNAMP), is a non-profit, non-government organisation whose current mandate is to research, train and advocate community participation in and co-management of critical natural resources in the Caribbean, with special emphasis on the Eastern Caribbean Region.

⁴ The charcoal makers practised a number of management techniques that reduced the environmental impact on the mangrove. These included the preservation of *Rhizophora* along waterways, selective cutting, and cutting to ensure coppiced regeneration (Smith and Berkes, in press; Walters and Burt, 1991b).

of CANARI has helped to reverse the government's ambivalent stand towards mangrove conservation by encouraging it to take legislative steps to protect the Mankote site (it was designated a Marine Reserve in 1986 under the St. Lucia Fisheries Act) (Smith and Berkes, in press). In contrast to the fuelwood plantation, the process of establishing co-management of the mangrove has been more difficult because, unlike upland forests which are under the Department of Forestry, mangroves fall under the jurisdiction of the Department of Fisheries and they lack both the interest and expertise to manage wood resources. Jurisdiction has also been complicated by the fact the National Development Corporation, which administers "lands", has argued that much of the mangrove falls under their control.

2.2 Talabong, Philippines

Site Description

The Talabong mangrove forest forms a barrier island at the mouth of South Bais Bay in Negros Oriental, Philippines (Figure 2). At about 208 ha, the site is five times larger than the Mankote mangrove in St. Lucia. Unlike the Mankote, the Talabong is fully exposed all-year-around to tidal marine influences. The dominant mangrove tree species found here include *Rhizophora apiculata*, *R. mucronata*, *Avicennia alba*, *A. marina* and *Sonneratia alba* (Calumpang, 1992; de Leon et al., 1991).

Mangroves are abundant in the Philippines, although they have been reduced to about one-third of their original extent as a result of clearing for fish ponds, rice production and urbanisation (Dolar et al., 1991; Primavera, 1991). In the Bais Bay area mangroves have been reduced from 800 ha to around 300 ha. The Talabong mangrove site, in particular, has been identified as nationally significant in the Directory of Asian Wetlands because of its economic and ecological importance as a marine spawning and nursery ground and because of its importance as wildlife habitat (Dolar et al., 1991; Scott, 1989).

Tenure History and Resource Use Patterns

Fairly intensive domestic use of the Talabong forest for fuelwood, fishing and other activities likely pre-dates any government involvement in the management of the area. Nonetheless, the Talabong forest is designated as timberland and thus falls under the jurisdiction of the Department of Environment and Natural Resources (DENR).⁵ For some years prior to 1985, the site was leased to a commercial concessionaire who extracted wood and sold

⁵ The DENR was formerly the Bureau of Forest Development.

it as fuel to commercial bakeries in nearby towns.⁶ During this period, wood cutting was intensive but managed. Forest guards prevented locals from cutting wood in large quantities.

The wood concession was cancelled and the DENR signed a memorandum of agreement with the Local Government of Bais City in 1985 to jointly protect and manage the Talabong forest as the "Talabong Game Refuge, Wildlife Sanctuary and Tourist Spot" (Scott, 1989). This designation in theory prohibited the collection and extraction of any fish, wildlife or wood products, except "waste products", from the mangrove. The initial effect of replacing management by private concession with management by government was a worsening of the condition of the mangrove as increasingly uncontrolled cutting took over to meet the market demands for fuelwood (Fernando Erejil, personal communication). This commercial market-driven deforestation was only brought under control when a concerted effort was made to stop the demand for fuelwood by outlawing its use by local bakeries.

But stopping the demand from bakeries has still not eliminated the enormous demand for mangrove products from the local population. Mangroves in the Philippines traditionally provide a diverse and abundant source to products to rural inhabitants, many of whom depend on mangrove resources for their livelihood (Jara, 1985). In the case of the Talabong forest, collection of fuelwood remains the single largest extractive activity (at least in terms of visible impact), even though this is now only done to meet household domestic needs. An estimated 30% of local households still rely on the Talabong forest for fuelwood, at least occasionally (Scott, 1989; F. Erejil, personal communication).⁷ Since only waste products are legally permitted to be collected, local people collect dead wood or they girdle live trees and remove the standing dead wood afterwards.

Some wood is also collected for construction materials, especially for use in various types of fishing traps and gears. This kind of wood extraction has declined in recent years as a result of the spread of backyard mangrove plantations which can be managed effectively to provide the straight poles used for fish gear construction (see below).⁸

⁶ Mangrove wood is an attractive fuelwood for bakeries because it is inexpensive and burns very hot (Fernando Erejil, personal communication).

⁷ During the Fiesta season, the local demand for wood from the mangrove soars as households build large fires for cooking pigs and other foods.

⁸ Mangrove wood is used extensively for construction of fish corrals and pens. *Rhizophora* species, in particular, are easy to plant and grow very rapidly. When planted closely together,

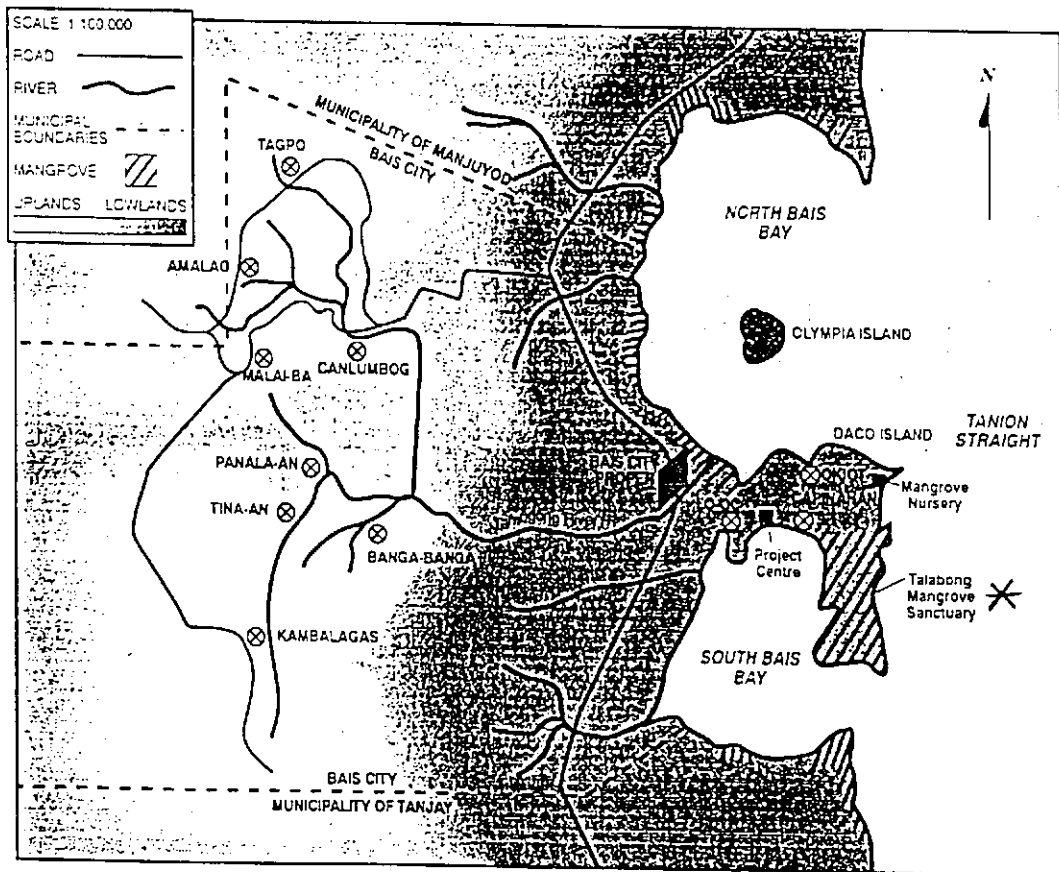
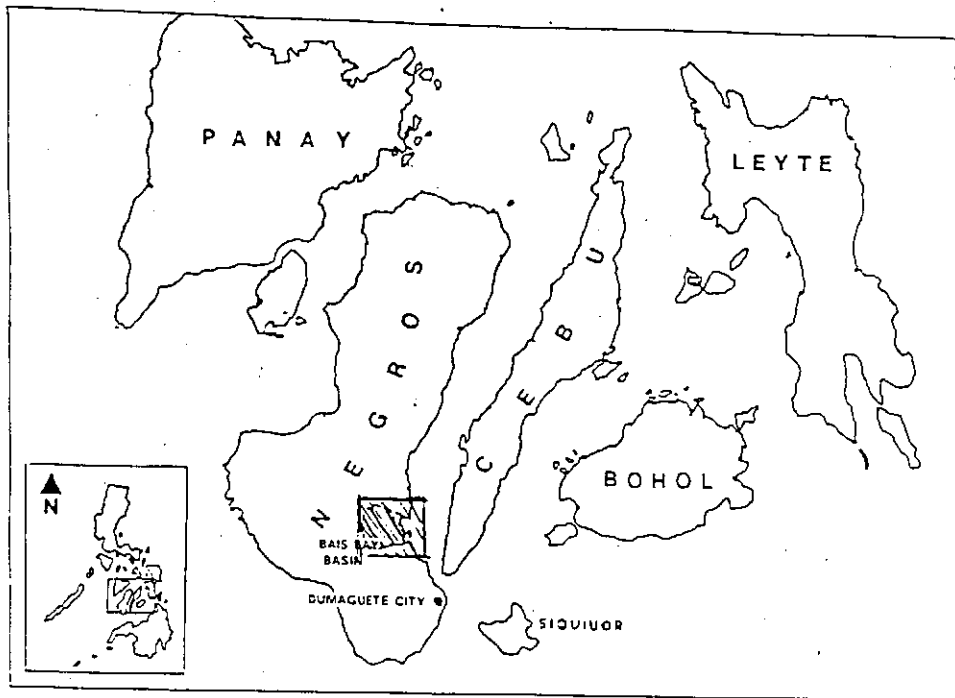


Figure 2. Location of the Talabong mangrove forest, Negros Oriental, Philippines.

Fishermen set fine mesh nets and build traps along waterways and the perimeter of the mangrove to capture young and migrating fish as they leave the protected confines of the mangrove and move seaward during falling tides. Locals collect an abundance of shrimps, crabs, and several shellfish species from the mangrove. Most of these activities do not pose a serious threat to the mangrove so little effort is made by local authorities to curtail them, even though they are illegal. As an exception, the modern method of collection of one type of highly valued mollusc causes considerable damage to mangrove tree roots and forest soils.⁹ This specific type of collection has been banned in practice by local authorities.

A variety of other, less important uses of the Talabong have been documented (Table 1). These include the collection of bark, nipa and other non-wood plant products for dyes, medicines, alcohol, and construction materials, and the collection of leaves for feeding goats. Hunting of ducks and heron by elites from nearby Bais City used to be common, but has stopped since the area was established as a wildlife sanctuary in 1985. The Talabong has also been used by the DENR and others as an important source of propagules for reforesting areas as far away as Bohol Island (Figure 2). In addition, a number of homes have been constructed near the shoreline border of the Talabong and a two hectare fish pond has been developed there, although it is no longer used.

Project Summary

Recent assessments of ecological productivity and visual surveys of forest stand cover indicate that the condition of the mangrove is poor as a result of the continuous and ubiquitous cutting and disturbance that continues to occur there (de Leon et al., 1991). Efforts to restore and protect the Talabong mangrove have centred around collaborative efforts between Silliman University, the Bais City Local Government and the DENR through the Bais Bay Basin Development Action Program (DAP).¹⁰ This program

these trees grow tall and straight and serve as ideal wood for fish trap and gear construction.

⁹ The local name for this type of mollusc is *embao* (*Phacoides philippinarum*). Traditional methods of collection involve poking a stick through the mud to identify individual shells. Little damage is caused to the substrate. In contrast, the modern approach involves excavating large areas of substrate to find individual shells. Young mangroves and mangrove roots are often damaged in the process (Fernando Erejil, personal communication).

¹⁰ The Bais Bay Basin DAP is a field project of a larger initiative called the Environment and Resource Management Project (ERMP). ERMP is a joint inter-university collaboration between the university of the Philippines at Los Banos and Dalhousie University in Canada, and is funded by the Canadian International Development Agency (CIDA).

has been ongoing for less than two years and has so far focused on (1) the restoration/protection of the Talabong mangrove forest and (2) the promotion of backyard mangrove reforestation to provide local residents with an alternative supply of mangrove products. While it is too early to assess the actual impact of the program on the Talabong mangrove, the experience so far does highlight some important features and lessons for the future.

The approach has been to propagate and promote the planting of a wide variety of mangrove species, instead of just the usual one or two *Rhizophora* species that are planted extensively throughout the Philippines. For this, an experimental multi-species mangrove nursery has been established in the local area as a joint project of Silliman University and a local fisheries college (CVPC).¹¹ This nursery serves to raise the profile and educate locals about mangroves and reforestation, but its primary purpose is to serve as a multi-species source of mangrove propagules for reforesting the Talabong area and household planting.

Project personnel have worked closely with the DENR to promote and monitor backyard mangrove planting as a means to reduce the local use of the Talabong Forest. To do this, they are taking advantage of a DENR stewardship program that provides local residents with private tenure security over nearshore areas as a means for promoting mangrove conservation. More specifically, these stewardship contracts provide home owners living by the sea with 25 year, renewable leases to small portions of intertidal land.¹² The contract stipulates as a condition of tenure that the lease holder reforest and use mangroves sustainably within his/her designated lot. Over two hundred of these contracts have been issued over the past few years to households located in three communities located nearest to the Talabong mangrove forest.

Unfortunately, the usefulness of stewardship contracts as a tool for promoting reforestation and conservation in the area has been limited, in part because of inadequate promotion and technical support and limited enforcement of contract conditions. A greater degree of community mobilisation with technical support will be required to make this component of the program more successful in the future.

The Bais City Local Government has also strengthened its commitment to conservation of the Talabong by paying salaries to local marine guards, called *Bantay Dagaat*, and instructing them to

¹¹ The Bais City campus of the Central Visayas Polytechnical College.

¹² Mangrove stewardship contracts, as with their upland counterparts, have been issued under the National Integrated Social Forestry Program (eg. Gibbs *et al.*, 1990).

increase their surveillance of the mangrove.¹³ While gross violations (cutting of live wood, harmful methods of shell collection, use of poisons for fishing, etc.) are increasingly under control, it is clear that the *bantay dagaat* turn a "blind eye" to many traditional resource uses.

3.0 DISCUSSION

Mangroves are highly productive ecosystems and unusual because they alternate between marine and terrestrial states depending on the tides or seasons. As a result, mangroves provide a variety and abundance of both forest and marine resources (Dugan, 1990; Jara, 1985). At the same time, access to mangrove areas either by land or by sea is difficult because of the variable wet and dry conditions and the typically dense and tangled mangrove vegetation. These factors combined were found to have important practical implications for conservation efforts described above. The remainder of this paper will examine these practical issues in some detail, according to the following inter-related categories: resource valuation, resource users and management, and tenure and administration.

3.1 Values of Mangroves

Mangroves have been undervalued in the past and policies reflecting this have promoted their widespread degradation and destruction in many countries (Dugan, 1990; Ruitenbeek, 1992). The functional values of mangrove forests (Table 1) have become increasingly recognised by policy-makers in recent years and trends in countries like the Philippines increasingly favour conservation over conversion. In light of this, it is perhaps ironic that the more tangible and measurable product values of mangroves are often ignored or poorly understood.

For example, natural resource agencies tend to recognise the ecological importance of mangroves, but they often underestimate their economic importance to local populations. Their interests tend to be narrowly focused on strict preservation or on one or two specific resource values, such as timber. Even more surprising,

¹³ The "Bantay Dagaat" is a joint program of the Philippine Coast Guard, Philippine National Police, the Departments' of Justice, Agriculture, and Education, Culture and Sports, and the Provincial Governors. The program is based on the voluntary participation of local residents who are trained and deputised with the authority to arrest persons engaging in illegal fishing activities (Narge Aarro, personal communication; Administrative Order # 114, Department of Agriculture, Republic of the Philippines). The Bais City government has taken it upon themselves to provide salaries to select *bantay dagaat* officers as a means of increasing their effort and commitment.

perhaps, are the development-oriented agencies and commercial interests which claim to base their decisions on economic terms. Yet it has been found that these same agencies also tend to ignore local product values and are often eager to promote the conversion of mangroves for other purposes, such as fish ponds, and residential or tourist development.

Part of the difficulty is that many of the product values of mangroves are consumed locally to meet basic needs and therefore never enter the formal market. In fact, mangroves often represent a marginal resource pool in the sense that poor coastal families are particularly dependant on them (Jara, 1985). The charcoal makers in St. Lucia are an example of a severely marginalised group whose livelihoods were almost entirely dependant on the mangrove. Likewise, many of the poorest families living near the Talabong view the mangrove as a resource of last resort. These observations highlight the importance of assessing the breadth of values in the identification of management priorities.

3.2 Resource Users and Management

Mangroves are so physically inaccessible and so ecologically variable over time that it is easy to miss or overlook patterns of local resource use within them. Nonetheless, an improved management system must be based on a clear understanding of the important resource users since these are, in effect, the managers of the present system. Our experience in both St. Lucia and the Philippines demonstrated clearly that attempts by government to apply management protocols for the mangroves have faced difficulties and, in some respects, worsened existing conditions by neglecting to account for local resource users. Successful steps have been based on strategies that target key resource users and work with them to (1) strengthen existing management systems that they employ within the mangrove (Mankote) and/or (2) provide them with viable alternative resources to the mangrove (Mankote and Talabong).

At the same time, it is clearly necessary to confront the interests of the non-local resource users, including commercial enterprises and government agencies. Different government agencies, it has been demonstrated, often have very different perceptions and priorities for mangrove resources. In general, these perceptions tend to neglect local resource user interests and so government management strategies are apt to undermine local management systems, which is counterproductive to both.

This can be demonstrated with an illustration of the Mankote mangrove in St. Lucia. Figure 3 lists six of the more important uses/values (or potential uses) of the mangrove and compares each one individually with the other five to demonstrate which uses or more or less compatible with each other. In most cases, there is

a degree of incompatibility, although this is often negligible or easily surmountable. Uses are strongly incompatible in only a few instances, as for example were the mangrove is converted into an entirely different use (a marina). The same kind of scenario would be revealed with an analysis if the resource uses of the Talabong mangrove, although an even greater number of important uses would have to be considered (Table 1). Highest levels of incompatibility would emerge, however, in response to single-use scenarios, including strict preservation or conversion to fish ponds.

Figure 3. Compatibility analysis of select important resource uses/values of the Mankote mangrove, St. Lucia. xxx = highly incompatible; xx = incompatible; x = slightly incompatible; + = compatible.

	charcoal	fishing	wildlife	dump site	tourism	marina
charcoal	+	x	xx	xx	+	xxx
fishing	x	+	+	xx	+	xx
wildlife	xx	+	+	x	+	xxx
dump site	xx	xx	x	+	xx	xx
tourism	+	+	+	xxx	+	+
marina	xxx	xx	xxx	xx	+	+

The point of this simplified analysis is to highlight the importance of identifying the many different uses and user groups as a basis for realistic planning and management of mangrove resources. Where resource uses are important and scenarios involve high degrees of incompatibility, there is likely to be serious problems encountered and serious costs incurred with the implementing of that management strategies. An approach that harmonises important local use values with external priorities through co-management will seek to reduce the number and degree of incompatible uses or attempt to provide alternatives to user groups displaced as a result of a given strategy.

3.3 Tenure and Jurisdictional Issues

The heart of an effective co-management strategy is an administrative arrangement based on coordinated government policies which acknowledge and provide legitimacy to local user rights (Korten, 1986; Pinkerton, 1989; Poffenberger, 1990; Smith and Berkes, in press).

I am unaware of any detailed studies of traditional tenure in mangroves. Traditional community institutions are said to have an important role in mangrove management in Indonesia (FAO, 1985). Likewise, the recent proliferation of studies documenting traditional tenure from other nearshore and coastal ecosystems

would suggest that such tenure arrangements may also be common in mangrove areas (eg. Cordell, 1989; Johannes, 1978; Levieil and Orlove, 1990). Traditional tenure in the Talabong has not yet been adequately investigated to determine whether or not it is important. Local resource users, in general, tend to come almost exclusively from the communities neighbouring the mangrove.

Experience with the Mankote in St. Lucia is similar in that earlier government policies that did not acknowledge local interests tended to encourage mis-use of the resource by the locals. At the same time, these same resource users appear to have applied their own informal access rules for management of the fuelwood resources once a degree of formal tenure security was provided to them (Smith and Berkes, in press).

Conflicting government policy towards mangroves in both St. Lucia and the Philippines are rooted in sectoral divisions that do not effectively reflect the diverse resource values of mangroves. As indicated from the case study above, as many as four different departments at once have applied competing policies for the management of the Mankote mangrove. The irony is that the department responsible for wood resources (Forestry) is not one of them! In St. Lucia's case, however, mangroves are relatively uncommon so its lacking an integrated policy framework for their management is not all that surprising. This has, nonetheless, been a source of considerable difficulty for working towards its conservation.

Jurisdictional conflicts over mangroves in the Philippines directly reflects the ambiguous division between forest and marine (fisheries) resources. At the national level, this conflict is visible between the Department of Agriculture, which is responsible for nearshore fisheries and aquaculture, and the DENR which is responsible for management of protected areas and most forest lands. Many of the more ecologically important mangroves have been designated as "timberlands" which are the jurisdiction of the DENR and are not supposed to be converted to other uses. The remaining mangroves have been classified as "Alien and Disposable" and are available for development into fish ponds and such through the authority of the Department of Agriculture. There has historically been considerable "grey" area in these classifications, in part because of rapidly changing national priorities which have shifted in emphasis from conversion to conservation of mangroves in the past two decades (DENR, 1990).

Practical difficulties arise, however, as a result of ambiguity and differing priorities between local and regional/national levels of government. The Department of Agriculture, in particular, has considerable autonomy at the local government level compared to the DENR, which historically has operated at the regional and national level. In the past,

4.0 CONCLUSION

Co-management strategies for mangroves are necessarily complex because they require recognition of diverse resource use and administrative interests which tend to be obscure for mangroves. Priorities will still have to be identified, however, and in many cases this will mean focusing efforts on the key resource users and government agencies whose actions are the most likely to threaten the long-term ecological integrity of the site.

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pressures to convert mangroves to private fish ponds and other developments have been so severe that timberland mangroves have often been informally "re-classified" by local government units. Unfortunately, once the process of clearing has begun, there is little authority or motivation to stop or reverse it.

Considerable progress has been made in recent years to create a more cohesive and comprehensive policy for mangroves in the Philippines (Umali, 1985). This has culminated with the passage in 1991 of comprehensive legislation for the development, utilisation and conservation of mangroves (DENR, 1990). In general, recent policy changes in the Philippines tend to encourage mangrove conservation over conversion, and at the same time provide many opportunities for strengthening local management of mangrove resources. The Local Government Code of 1991 complements changes in mangrove-specific policy by increasing the authority of local governments in mangrove management (Brilliantes, 1993).

Perhaps the most significant advances are the social forestry policies which provide legal tenure to individual households and to local communities and organisations (DENR, 1990). As indicated in the case study, the project work with Talabong has begun to make use of household stewardship agreements as a mechanism for promoting backyard, private planting as an alternative to the Talabong. This has much potential in Bais given the extent of voluntary planting that has been done already in the area and the increasing popularity of the program among local residents.¹⁴ And while the assumption of project personnel has thus far been to maintain strict legal preservation of the Talabong itself, our experience has shown that many traditional uses are continuing unabated. In fact, the disturbing observation is that government policies appear to indirectly promote deforestation of the mangrove by encouraging locals to kill the trees (by girdling them) rather than just cutting parts of them to obtain wood. For the Talabong case, thought might be given to applying the concept of "Communal Mangrove Forest" which could provide local users with a greater incentive to conserve the resource.¹⁵

¹⁴ A number of residents began planting mangroves near their homes for personal use about ten years ago, before the stewardship program was actually in progress. As indicated in the text, many residents have since participated in the stewardship program in the area and many more have expressed interest in becoming involved because backyard plantations provide a ready source of wood products, a site for growing and collecting molluscs, and protection from storms. A relatively small, well-managed plot of mangroves can meet many of the needs of a household.

¹⁵ Communal Mangrove Forest designations provide local communities with exclusive use rights to mangrove resources and are thus seen as a mechanism for fostering community-based resource management (DENR, 1990).

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