

**Lessons from the
Equator Initiative:
Community-based management
by Pred Nai Community Forestry
Group in the mangroves of
Southeastern Thailand**

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List of Acronyms and Abbreviations

APEC:	Asia-Pacific Economic Cooperation
CODI:	Community Organization Development Institute
DMCR:	Department of Marine and Coastal Resources
CCRMN:	Community Coastal Resource Management Network
GEF:	Global Environment Facility
PAR:	Participatory Action Research
PNCFG:	Pred Nai Community Forestry Group
RECOFTC:	Regional Community Forestry Training Center for Asia and the Pacific
RFD:	Royal Forest Department
SGP-PTF:	Small Grants Programme for Operations to Promote Tropical Forests
SIF:	Social Investment Fund
TEK:	Traditional Ecological Knowledge
TRF:	Thailand Research Fund
UNDP:	United Nations Development Programme

Chapter 1: Introduction

1.1 Background

The problems of ecological degradation and poor economic development have generally been dealt with separately as two unrelated issues. Conventional thinking from within both the conservation and development perspectives view the two goals as antagonistic. Conservationists have seen development as a threat to conservation while the development perspective viewed conservation as an obstacle to development (Brown, 2002). As a result of this thinking, ecological degradation was commonly dealt with by conservation organizations and governments through the creation of protected areas which excluded local resource users. These top-down, government implemented initiatives have enjoyed limited success (Agrawal & Gibson, 1999; Dietz et al., 2003). On the other hand, common approaches towards economic development also involved large-scale, top-down approaches by national governments and international development organizations. In general, these initiatives have met with minimal success as they have failed to take into account economic, ecological and social realities within communities and/or failed to meet the needs and desires of the people that they purported to assist.

Conventional approaches to economic development and ecological conservation hold numerous characteristics in common. First, they are top-down. This means that the projects are designed and initiated by higher levels of government or international organizations and then implemented within local communities, usually without consultation and with little consideration of local circumstances. This contributes to the second characteristic, the exclusionary nature of these projects. They are exclusionary because they are prescriptive and fail to recognize the needs and priorities of community members who are supposed to benefit from development.

The limited success of these “top down” initiatives has led to the implementation, in recent decades, of completely new approaches to development. Chief among these is the strategy known as community-based resource management (Brown, 2003a; Brosius et al., 1998). Rather than taking a top-down, mechanistic approach to addressing the problems in the developing world, community-based resource management is participatory in nature and takes a more holistic, integrative approach to the problems facing communities (Berkes, 2004). Community-based management can be considered holistic and integrative because it is generally designed with multiple objectives, dealing with the numerous problems which the community in question may be facing and often adapting and changing over time. This is opposed to top-down approaches which tend to be designed with very specific objectives, which sometimes conflicts with the interests of the community. The holistic, integrative nature of these projects comes about largely because they are participatory, and the goals and objectives are, therefore, defined by the very people who are faced with the consequences of poverty and ecological degradation (Brosius et al., 1998). Community-based management can be seen as a form of management which is flexible, adaptive and

responsive to the needs of the community. In other words, community-based resource management projects have the capacity to simultaneously deal with the multiple objectives of community economic development, and the conservation/sustainable use of natural resources.

In 2002, the United Nations Development Programme (UNDP) held the first round of Equator Initiative Awards. The Equator Initiative recognizes the fact that the tropical region of the earth holds the Earth's greatest resources of biodiversity and also many of the world's poorest nations (UNDP, 2004). As a result the biennial Equator Initiative award was designed to reward community level development programs which are successful in conserving biodiversity and at the same time alleviating poverty and generating sustainable livelihoods. Thus the two cycles of the award, 2002 and 2004, have each provided numerous examples of community-based management and conservation programs which were successful in both conserving biodiversity and providing sustainable livelihoods for their community (Koziell & McNeill, 2002).

1.2 Purpose

The overall purpose of this research was to study a successful example of community-based resource management and learn about the institutional and organizational characteristics, and the cross-scale linkages that contributed to the success of the project.

As one of the 27 finalists in the United Nations Development Programme 2004 Equator Initiative awards (UNDP, 2004), the Pred Nai Community Forestry Group in Thailand may be considered an example of a successful community-based resource management initiative. Since successful cases are uncommon (Songorwa, 1999; Barret, 2000; Kellert et al., 2000), the Pred Nai Community Forestry Group is of great interest, in order to learn what makes it possible to fulfill the dual objectives of generating sustainable livelihoods while conserving biodiversity.

1.3 Objectives

In order to learn lessons from this successful community-based management program the research efforts focused on analysis of three key elements of the institutional and organizational framework of this project. The three research objectives which fulfill the overall purpose of this research are:

1. To examine the role of self-organization within the Pred Nai Community Forestry Group.
2. To examine the cross-scale institutional linkages of the Pred Nai Community Forestry Group
3. To examine how local ecological knowledge is utilized within the project.

First, research focused on understanding the self-organizational aspects of the Pred Nai Community Forestry Group. Self-organization is a measure of the degree to which a complex system (ecological or social) is able to organize and

influence its own structure and characteristics (Holling et al., 2002). Leadership within the community was also examined as it is often an important factor in self-organization (Olsson et al., 2004).

Second, this research examined the cross-scale institutional linkages present in the Pred Nai Community Forestry Group. Cross-scale linkages consist of both vertical (across levels of organization) and horizontal (across space) linkages. Vertical linkages are present in community-based management because the community does not exist in an institutional vacuum; local institutions and authorities will interact with those that exist at other levels of authority including district, state and national levels. Linkages across institutional levels are important because effective resource management cannot be conducted at only one scale (Ostrom et al., 2002). The involvement of multiple levels of authority, therefore, allows for utilization of the competencies of specific institutional levels while mitigating their weaknesses through the inter-connectivity of different agencies (Pomeroy & Berkes, 1997). Horizontal linkages are concerned primarily with the linkages and connections across space, largely between communities.

Third, the role of local ecological knowledge, its use, and integration with conventional scientific knowledge was examined in this project. There is growing recognition in the academic literature that local and traditional ecological knowledge holds the potential to contribute to natural resource management and conservation (Smith & Berkes, 1993; Berkes et al., 2000; Striplen & DeWeerd, 2002; Berkes & Folke, 2002). This research documents the manner and mechanisms by which local ecological knowledge was utilized in this project and how it was reconciled with conventional scientific knowledge.

1.4 Methods

This research was conducted within the qualitative paradigm as a single-case, case study. The research questions were explored principally through collection of primary data sources. In order to collect the necessary primary data, the researcher spent approximately four months in Thailand; about half in the village of Pred Nai itself, collecting and verifying the necessary data. A translator from a nearby university was employed in order to enable the researcher to communicate with local people effectively. Interviews were the primary means of data collection and they were conducted with villagers and local leaders involved in the Pred Nai Forestry Group, government personnel and other key people involved at various organizational levels. Participant observation in the daily life and livelihood activities of villagers was employed by the researcher in order to gain a better understanding of issues from villagers' perspectives. A number of workshops and one-on-one sessions were also conducted with key informants in order to probe questions further, confirm data and diagram the involvement of outside agencies.

1.5 Study Area: Pred Nai Community Forestry Group

The Pred Nai Community Forestry Group is a community-based natural resource management program begun by villagers in the mangrove forests of eastern Thailand near the Cambodian border (UNDP, 2004). Villagers initiated the project in 1986 in response to resource extraction activities of logging and intensive shrimp aquaculture the wake of the logging activities. These extractive industries run by outside business interests offered little in the way of economic benefit for local people. More importantly, these activities destroyed and degraded the mangrove forest environment, and prevented the villagers from gaining access to the mangrove forests which they had long used. The villagers responded by forming a group in order to put a stop to the logging and intensive shrimp aquaculture and thereby re-established their use of the mangrove forest. The villagers' informal efforts have since developed into a successful community-based resource management organization and have expanded their program through networking with other local villages.

The Pred Nai Community Forestry Group has been working towards the sustainable use and restoration of the local mangrove forest. The principal means that they have used include the development of a forest management plan and restoration of formerly logged and degraded areas. The restoration of mangrove forest areas is vitally important as studies have shown that Thailand has lost nearly half of its mangrove forests in the preceding three decades (Barbier, 2000; Huitric et al., 2002). In addition to stopping the loss of existing biodiversity, their efforts have also resulted in the return of many formerly displaced native fauna, including species of wetland birds and monkeys.

Their conservation efforts have also had a direct impact on alleviating poverty and facilitating local economic development. This has come about through the restoration and improvement of yields in the local crab harvest, the development of mud crab farming in former shrimp farms, the utilization of non-timber forest products from the mangroves, and the establishment of a village savings fund to assist with social and economic development initiatives. The restoration and conservation of mangrove forests also improves the long-term sustainability of the villagers' economic activities.

1.6 Study Limitations

As previously stated, the purpose of this study was to learn about the organizational and institutional framework in place and how it contributed to the success of the project. This research will, therefore, proceed under the assumption that this project is successful, and as such, no attempt will be made to evaluate or assess the success of the Pred Nai Community Forestry Group in any manner.

Organizational and institutional structures in community-based management tend to be flexible and dynamic. This research, however, was conducted over a relatively short period of time. As a consequence, the results from this research must be recognized as a "snapshot" in time resulting from the context and conditions occurring within the study area during the duration of the research.

Due to the nature of the information sought, this research has been designed to utilize a participatory approach to data collection. Since community participation is crucial to the nature of this study any real or perceived cultural barriers may hinder data collection. In addition, language barriers necessitated the use of a translator which limited, to some degree, the depth and breadth of questioning possible and increased the chance of miscommunication of meaning.

Chapter 2: Situational Context and Background

2.1 Theoretical Background

2.1.1 Community-based Management

An increasingly common approach to socio-economic development and conservation in many parts of the world is community-based resource management and conservation. Community-based natural resource management, however, is somewhat difficult to define precisely. By its very nature, community-based resource management is dynamic and its form and function will often differ greatly in each community depending on the site and situation of the community in question. There are, however, challenges inherent to a community-based approach. Brown (2003a) identified three challenges to people-centred conservation efforts: (1) to incorporate the different understandings, meanings and values that stakeholders have in regards to biodiversity, the environment and nature; (2) to incorporate the plural knowledge, values and interests of the stakeholders into the decision making process and; (3) to develop new institutions for conservation and development which are more flexible and adaptive than existing institutions.

There is some debate currently underway in academic circles about whether or not community-based conservation/management actually works to meet conservation and development goals (Barrett, 2001; Kellert et al., 2000). Berkes (2004; p. 624) submits the following to the debate:

Asking whether community-based conservation works is the wrong question. Sometimes it does, sometimes it does not. Rather, it is more important to learn about the conditions under which it does or does not work.

Berkes (2004) also points out that there are a number of interdisciplinary research subfields; such as: common property, traditional ecological knowledge (TEK), environmental ethics, political ecology, environmental history and ecological economics; which have made contributions towards understanding the conditions under which community-based conservation/management works. These research subfields have yielded lessons for community-based conservation, including: the importance of cross-scale conservation, adaptive co-management, the question of incentives and multiple stakeholders, use of traditional ecological knowledge, and developing a cross-cultural conservation ethic.

There is growing recognition that community-based management holds the potential to function as a form of adaptive management (Olsson et al, 2004; Berkes, 2002; Berkes et al, 2000). Within a community-based management setting, management authority is nested within the community and there is less organizational distance, or barriers, between those who are directly connected to the resource and those with decision-making power. Thus, within a community-based management program monitoring, learning, and adaptation can more easily

be integrated into the management system. Adaptive management is an iterative approach to management, based upon learning from both successful and unsuccessful policy approaches (Berkes et al., 2000; Berkes, 2002). Whereas many conventional forms of resource management have focused upon making natural systems more predictable and reliable; adaptive management is flexible, accepts uncertainty, and focuses on learning about the system, as opposed to controlling it (Berkes, 2002). An adaptive approach to management focuses not only on understanding natural systems but also on the social systems which relate to resource management (Olsson et al., 2004). This leads to a more dynamic and responsive institutional and organizational framework.

2.1.2 Self-Organization

Self-organization is a measure of the degree to which a complex system (ecological or social) is able to organize and influence its own structure and characteristics (Holling et al., 2002). Thus self-organization in this sense refers to the ability of the community in question to organize and implement institutions regarding access and utilization of the local common-property resources. Leadership within the community is also an important factor within self-organization (Olsson et al., 2004), as leaders are usually required to mobilize the grassroots support and provide coherence and direction in community-based management or conservation efforts.

2.1.3 Cross-scale Institutional Linkages

The concept of cross-scale institutional linkages refers to the connections present between institutions both horizontally and vertically (Berkes, 2004). Horizontal linkages refer to connections between institutions across space, for example, the networking and cooperation of fishing villages along a section of coastline. Vertical linkages refer to the connections which occur between institutions across levels of organization, for example multiple connections may exist between different organizations at the village, state, national and international level.

Cross-scale institutional linkages are important because there is, in most cases, a misfit between institutions and the ecosystems which they attempt to manage (Brown, 2003b). Government run top-down, command and control approaches to manage natural resources in developing nations have failed (Agrawal & Gibson, 1999; Dietz et al., 2003). Conversely, complete devolution of power and authority to communities has also proven inadequate for management. When management becomes too decentralized connections between adjacent communities may be lost (Berkes, 2002), and local resource institutions may not have the capacity to deal with all facets of resource management effectively; such as formal rules and legislation, or research. The fact that community-based natural resource management initiatives have met with mixed results bears this out (Berkes, 2004; Barrett et al., 2001; Smith & Berkes, 1993). The failure of both top-down and strict community level management indicates that effective management of natural resources cannot be accomplished by management operating only at one scale (Berkes, 2002; Folke et al., 1998).

The reason for this apparently confounding situation is that environmental and resource management issues are not large-scale or small-scale, but rather act across multiple scales, in terms of both space and time (Folke et al., 1998; Berkes, 2002). As a result, management of these resources needs to be undertaken, simultaneously at different levels (Folke et al., 1998; Berkes, 2002). When management is undertaken at multiple scales it allows for the utilization of the strengths of various levels, while minimizing the weaknesses present at other levels (Pomeroy & Berkes, 1997). For example, the local level is more in touch with the resource base in question, allowing for closer monitoring of feedbacks; while the state or federal levels have the technical capacity and funding needed for advanced scientific research.

There is potential that the tighter connections resulting from cross-scale linkages may result in a gradual shift of power away from the original institutions. Within the context of community-based management, the community itself acts as both the operative level in which most management activities are conducted; and as the foundation for management authority. Although community-based resource management holds great promise to achieve both conservation and socioeconomic development, it is also true that “community-based resource management systems cannot be revitalized in isolation... it will require the development of legal, administrative and institutional arrangements for defining legal status, rights and authorities” (Pomeroy, 1995, p. 149). Cross-scale institutional linkages are thus an important enabling conditions for community-based resource management.

2.1.4 Sustainable Livelihoods & Biodiversity

As poverty alleviation is one of the two objectives of the equator initiative awards it is important to place both poverty and livelihoods within the context of the relevant literature. Poverty is defined as a lack of physical necessities, income, and assets; and is often related to other facets of deprivation including isolation, vulnerability, powerlessness and physical weakness, making it more than just income deficiency (Chambers, 1995). Chambers (1995) also points out that it is important to recognize that the subjects of poverty and those who are studying their situation may have very different conceptions of poverty. As a result, during fieldwork and analysis it is important to consider poverty in terms of the local reality and locally perceived deprivations, not only those perceived from an outsider’s reductionist and often narrow vantage point (Chambers, 1997; Chambers, 1995).

Scoones (1998, p. 5) defines a livelihood as follows: “A *livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living.*” Scoones (1998, p. 5) continues on to define sustainable livelihoods: “A *livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base.*” Sustainable livelihoods are

often an important socioeconomic goal of community-based resource management.

It is important to recognize that a livelihood, especially in developing nations, means much more than just financial income (Chambers, 1995; Scoones, 1998). Livelihoods in the developing world very often consist of the use of products, services, and land from locally available natural areas (Salafsky & Wollenberg, 2000; Scoones, 1998). This understanding of livelihoods allows for the recognition of the fundamental linkages between the social and ecological systems. The linkages present between livelihoods and the ecological system which supports them requires, in order for a livelihood to be sustainable, that the natural resource base which forms a key part of the livelihood must be utilized and harvested in a manner which is sustainable.

In order to link sustainable livelihoods with conservation objectives, Salafsky & Wollenberg (2000, p. 1423) developed a conceptual model which includes three categories: (1) *No linkage between livelihoods and conservation: protected areas*; (2) *Indirectly linking livelihoods and conservation: economic substitution*; (3) *Directly linking livelihoods and conservation: linked incentives for conservation*. The research, which this proposal is concerned with, falls within the third classification, directly linked livelihoods and conservation, since the local villagers livelihoods depend largely on the products and services which they obtain from the local mangrove forest.

The United Nations Convention on Biological Diversity defines biological diversity as a measure of “the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; including diversity within species, between species and of ecosystems.” (UNEP, 1992). Biodiversity is important in its own right, as it is indicative of the integrity and natural functioning of ecosystems.

From an urbanized, wealthy or western perspective it may be quite difficult to conceive of any direct or consequential linkages between biodiversity and sustainable livelihoods. The fact is that many people, especially the poor in developing nations, depend directly upon the ecosystem and the diversity of life and services that it offers in order to meet their basic needs (Salafsky & Wollenberg, 2000).

Biodiversity is fundamental to the maintenance and promotion of human livelihoods, either directly or indirectly. For the rural poor in developing countries the linkage between biodiversity and livelihoods is direct as all or a significant portion of their livelihoods are derived from the harvest or utilization of ecosystem products and services. The loss of biodiversity, therefore, has a direct negative impact upon livelihoods.

Loss of biodiversity also directly lowers the resilience of ecosystems, endangering the stability of the ecosystem as a whole and resulting in the loss of security of livelihood activities. The loss of biodiversity also reduces the number of potential livelihood options available to local people, making them more dependent upon their remaining livelihood activities. By increasing their dependence upon a smaller pool of resources the social system is also less resilient and stable.

People must, necessarily, look after the survival needs of themselves and their families. It is, therefore, important that the livelihoods of local people are given importance in planning resource management programs. Natural resource management programs which explicitly recognize the needs of local people and work towards livelihood based goals can improve both the participation and compliance of local people within a resource management plan. In other words, livelihood issues may act as a primary motivator for local people to participate in community-based management and thereby move towards sustainability and conservation (Marschke & Berkes, 2005).

2.2 Pred Nai Community Forestry Group

The village of Ban Pred Nai is located in section 2, Hung Nam Khao sub-district, Muang district, Trat Province, near the Cambodian border in Southeast Thailand (see **Figure 1**). As of 2004, the village was home to approximately 560 people from approximately 130 households (Kaewmahanin, 2004). Nearly all of the residents are ethnic Thai and follow the buddhist faith.

The village of Ban Pred Nai is located at the base of a peninsula which extends south from the mainland into the Gulf of Thailand. **Figure 2** clearly illustrates the 1920 hectares of mangrove forest, one of the largest contiguous blocks on Thailand's Eastern Seaboard, visible to the west of the village of Ban Pred Nai. The mangrove forest near Pred Nai, moving from lowest to highest elevation, follows a general profile of areas dominated by *Avicennia* sp., *Rhizophora* sp., and in the highest elevations *Bruguiera* sp. Land-use in the region also follows a profile based on elevation and distance from the sea. Moving up from the mangrove forest in the inter-tidal zone, one encounters fish farms, followed by houses mixed in amongst fruit gardens. The highest elevations are occupied by a mix of fruit gardens and rubber plantations. Similar to the rest of the country the region has a tropical climate; hot and humid with a monsoon season typically lasting from May to October.

The village was founded over one hundred years ago by approximately 10 families and has grown largely from natural, internal growth. The mangrove forest near the community has been managed by the government, through the Royal Forest Department (RFD), as a reserve forest with some small-scale commercial logging carried out. In the mid 1980s corporations intensified their harvest of trees from the mangroves and began constructing shrimp aquaculture ponds in the wake of the destruction.



Figure 1: Map showing the location of Ban Pred Nai (Source: <http://www.cia.gov/cia/publications/factbook/geos/th.html> & GIS data)

Before the start of the large-scale logging and intensive shrimp aquaculture, Ban Pred Nai relied on rice agriculture in the lowlands and fruit and rubber plantations upland for its principal economic activities, with livelihoods supplemented by harvest of resources from the mangroves. After the partial destruction of their local mangrove forest and the establishment of large industrial shrimp aquaculture operations most villagers converted their former rice fields to intensive shrimp aquaculture operations. In time, the productivity, and profitability, of the intensive shrimp aquaculture operations began falling due to disease and the increased inputs required to maintain productivity. The village finally banned intensive shrimp aquaculture within their community and the shrimp farms were converted to fish aquaculture operations. Currently fish aquaculture, fruit and rubber plantations, are the principal economic activities in the village. Another important activity in the village is the harvest of crabs for commercial sale. The two most important crab species are: Grapsid Crab (*Grapsidae* sp.), a principally terrestrial species; and Giant Mud Crab (*Scylla serrata*), a marine crab. The harvest of these commercially important crabs is significant in Pred Nai as there are



Figure 2: Satellite Image of Ban Pred Nai (Source: Google Earth)

approximately 20 part-time crab collectors, 25-30 part-time or seasonal collectors, as well as numerous crab buyers/processors in the village. A small but increasing number of villagers also work wage jobs in nearby towns. Livelihoods are also supplemented by harvest of resources from the mangroves for household use. Most households own land and are engaged in a mix of aquaculture or agriculture, however, there are approximately five-ten households in the village which are landless and rely solely on the commercial harvest of Grapsid mangrove crabs for their household income.

Chapter 3: Results and Discussion

3.1 Community Organization

a. Origins of the project

i. Date of community initiation

Initial community organization began in 1986 and centered around a small group of five to ten villagers who banded together in order to fight off the corporate logging and shrimp aquaculture operations operating within Pred Nai's mangrove forest. These extractive and destructive operations were run by outside corporations that operated in violation of government regulations requiring replanting of logged areas. Resistance to the corporations was widespread through the community and came mostly in the form of protests to government authorities who largely ignored the villagers' complaints. The small group of five to ten which formed the core of the resistance armed themselves and actually fought against the workers in the mangroves, and it was their actions that were key to forcing the corporations to cease operations.

ii. Date of formal establishment

The Pred Nai Community Forestry Group was formally established in 1998.

iii. What inspired or precipitated the project? What were the sources of inspiration for the project?

1. Whose idea was it?

The villagers of Pred Nai began the initial resistance to the corporate destruction of their local mangrove forest. It was recognized by the local people that the logging operations coupled with the construction of intensive shrimp aquaculture ponds in the wake of the cutting would eventually eliminate all of the remaining mangroves, thus eliminating an important primary and supplemental source of income for the villagers. Thus, the initial resistance was formulated by a small group of five to ten local people, without outside support, in response to a direct threat on local livelihoods.

After the expulsion of the corporations, logging and charcoal production continued to be conducted illegally by other local people from the area, including former employees of the logging companies. Thus informal patrolling of the mangroves was initiated by the villagers of Pred Nai in order to protect and conserve the natural resources of the local area.

The creation of the formal management organization, Pred Nai Community Forestry Group, occurred as a result of a number of different factors. In 1993 a local Buddhist monk came to Pred Nai and assisted the villagers in setting up a village savings group. The group was established with the dual purpose of providing a safe mechanism for villagers to save their money and earn some interest while at the same time, keeping the savings within the village so that it could be loaned out to other villagers in order to improve social welfare. This is

accomplished through low-interest rate loans to villagers who are in need of money for things such as education, or health care. In this way, the village savings group acts to improve the social welfare of the village. Additionally, the savings group helped to increase the unity within the village, and also helped to develop village leadership in terms of organizational ability and the management of money. The monk also utilized the savings group as a platform to further educate villagers about conservation.

The villagers of Ban Pred Nai initiated the creation of Pred Nai Community Forestry Group as a formal entity in order to conserve and protect their local mangrove forest. The decision by the villagers to create a formal management group was influenced largely by three separate factors. First, there was a widespread appreciation within the village for the importance of conservation after losing their mangroves at the hands of the corporate interests. The second factor was the creation of an informal patrol group by the villagers, in order to protect the local mangroves against the indiscriminate harvesting practices of people who were logging in order to produce charcoal. The third factor was the influence of the Village Savings Group. The Village Savings Group helped to improve the organizational capacity of the villagers and also increased their skills managing and accounting for relatively large sums of money.

2. Trigger event, if any.

The key trigger event for the villagers' initial resistance to the corporation's activities was the construction of intensive shrimp aquaculture farms in the wake of large-scale logging activities. Logging had occurred regularly in this area for a number of years; however, in 1986 one corporation partnered with the logging company and began constructing ponds for intensive shrimp aquaculture. This activity ensured that natural reforestation or manual replanting would not be able to take place in the mangroves and, thus, that the livelihoods and lifestyles of the villagers were endangered.

In the case of the creation of the formal management group there does not appear to be a single trigger event. Instead, Pred Nai Community Forestry Group came about largely as the culmination of a number of seemingly unrelated activities that occurred over time, including the informal patrolling of the mangroves, the creation of the village savings group, and the development of strong leaders within the community.

3. Catalytic element, if any

One of the key element which contributed to the success of Pred Nai was the early involvement of the RFD and the NGO RECOFTC (Regional Community Forestry Training Center for Asia and the Pacific). The RFD was important in assisting the villagers in transitioning from an informal patrol group to a formal management group. The RFD's early assistance was in the form of technical support, assistance with the development of a first draft management plan, and providing saplings and training for reforestation. RECOFTC's involvement with Pred Nai began in

1999, only a year after the formal establishment of the conservation group. RECOFTC's early involvement came in the form of: capacity building, assisting with surveys of the mangroves, technical support, and assisting with the development and refinement of a management plan for the conservation group.

It is also important to note the important role of the strong leaders present within the village. One in particular was critical in the initiation of the conservation group, and strong leadership within the village has ensured that progress has been made towards stated conservation objectives and unity has been maintained throughout the village.

b. Leadership and key people

i. Individuals: locals and/or outsiders. What role did they play? How did their role change during the course of the project?

Male leader: This individual became a leader within the community during the beginning of the initial resistance to the destruction of the mangroves. After the expulsion of the corporations he became the leader of the informal patrol group and, in time, was elected as the village headman. As village head he was instrumental in expanding conservation efforts, creating the formal conservation group, and adopting the mantle of leadership after its creation. About three years ago he was forced to resign all of his leadership positions due to illness, but he has since resumed his position as head of Pred Nai Community Forestry Group. Currently, within the village, in order to avoid conflict or potential overlap with the current village head, his focus is more external. This individual is also very active in networking and serves as head of the Trat Provincial Conservation Network and the Four Province Conservation Network.

Female leader: She is the current village head, and is actively involved in many aspects of both village administration and local conservation. In her capacity as village head she is involved in many community forestry networks and often liaises with government departments. Currently within the village, in order to avoid conflict or potential overlap with the current leader of Pred Nai Community Forestry Group, she has shifted her focus to be more internal but still maintains many of the existing external linkages which she helped to establish.

Local Buddhist monk: This man played an important role in introducing Pred Nai to the concept of a village savings group and helping them to implement it. He was also actively engaged in educating the villagers about the importance of conservation and was instrumental in changing local people's attitudes towards the environment. After the creation of the formal conservation group the monk also helped the village to obtain funds from SIF (Social Investment Fund of the World Bank) in order to buy boats for patrolling, to build a cabin in the mangroves, and to build a walkway through the mangroves.

ii. Key organizations: locals and/or outsiders. What role did they play? How did their role change during the course of the project?

The Thailand Royal Forest Department (RFD): This department was an important organization in the early days of the Pred Nai Community Forestry Group. Until 2002 this was the government department with the legal responsibility for the management of the mangrove forest. Local officials from the RFD encouraged Pred Nai to create a formal conservation organization and assisted them in the development of their initial management plan. In 2002, the Department of Marine and Coastal Resources (DMCR) was created and the mandate for mangrove forest management was transferred from the RFD to the newly formed DMCR. Since this time RFD has played no official role in the mangroves of Pred Nai, but individuals from the RFD still maintain contact with the community. and have helped to organize study trips to Pred Nai so that people from other communities can come to Pred Nai and learn from a successful example of community forestry.

RECOFTC: This NGO was a key organization, not in the initiation of Pred Nai Community Forestry Group, but in the early development of the formal conservation group. RECOFTC first became involved with Pred Nai Community Forestry Group in 1999 and one of their first actions was to organize study tours for community leadership to other community forests in Thailand in order for Pred Nai's leadership to learn first-hand from their peers. Soon after RECOFTC developed a three-year Participatory Action Research (PAR) program with Pred Nai, in which they assisted the community: to conduct surveys and inventories in the mangrove forest; to begin capacity building programs; to establish of community forestry networks; and to enter into collaborative research projects between the community and RECOFTC.

c. Funding and other resources

i. If there was funding for initial community organization, who provided the funding?

The initial, informal, organization received no outside funding at all. During the resistance to the corporations and during the period of informal patrolling the community received no outside funding at all. All activities were grassroots in nature, organized and carried out by local people and any costs, such as fuel costs for boats during patrols, were absorbed and shared by those in the village participating in the activities.

The first outside funding provided to the community came in 1999, shortly after the creation of the formal conservation group. In 1998, in the wake of the Asian financial crisis, the World Bank provided money to the government of Thailand to assist with both business and social development. The money designated for social development was used to create the Social Investment Fund (SIF) to assist social development in Thailand. The 1.8 million baht (approximately \$45,000 USD) in SIF funding received by Pred Nai was used to buy three boats for patrolling the mangroves, to build a cabin in the mangroves as a station for patrol

groups, and to build a 2.8 km walkway through the mangrove forest that could be used for education and tourism.

Shortly after Pred Nai received this money from SIF, RECOFTC became involved with Pred Nai (the former director of RECOFTC discovered Pred Nai through its SIF funding) and began assisting with a forest inventory as well as social inventories and assessments. In 2000, Pred Nai was selected as the site for a large scale, three year, three million baht (approximately \$80,000 USD), participatory-action research project. The three objectives for this project were: 1) evaluate and monitor resource use; 2) develop a forest management plan; 3) establish networking between stakeholders involved. Although the funding from this project did not go directly to the conservation group, as participatory research the community members were actively involved and the results, as well as the process (i.e. capacity building, establishing networks) served to benefit the community greatly.

ii. If there was capacity building, including training workshops, who funded it?

Within the PAR project begun by RECOFTC with Pred Nai Community Forestry Group, capacity building, in both a formal and informal sense, was an important part of the project. Informal capacity building took place through the participation of villagers in the RECOFTC projects. This included actual research as well as the social and forest inventories, where villagers learned skills in using GPS receivers and mapping, as well as skills relating to the conduct and documentation of research. Formal capacity building consisted of RECOFTC bringing village leaders on study trips to other community forests in Thailand (this also contributed to networking), as well as covering the transport and other expenses to bring village leaders to formal training conferences run by RECOFTC or attended by members of RECOFTC.

Other forms of capacity building that have been important in Pred Nai include training provided by various government departments in order to fulfill needs within the village. For example, when villagers began informally patrolling the mangroves, training was provided by the Fisheries Department in conjunction with local army units. Training, as well as manpower and seedlings, in reforestation efforts have also been provided by both the RFD (in the past) and currently the DMCR.

In addition, one local network, which consists of two sub-districts, Hung Nam Khao (which Pred Nai is part of) and Ao Yai has received funding from the UNDP GEF/SGP-PTF small grants fund, principally for reforestation. Pred Nai's participation in this project is largely advisory, as there is little need for reforestation in the area around Pred Nai. Part of the aim of this project, however, is also capacity building and the researcher was able to attend a weekend long training course held for villagers and children from communities involved in this

network in which they were taught map reading skills and then participated in construction of a 3D topographic model of their local communities.

1. NGO and Gov't personnel providing their time or services for free

Many government agencies have provided assistance to Pred Nai in the form of manpower or training, instead of, or in addition to, material assistance. Locally stationed army units provided training to Pred Nai for patrolling. In the past they would also assist village members with their patrols and in some cases individual soldiers would also volunteer their own time to assist the Pred Nai villagers. The RFD and DMCR have also helped to train villagers in reforestation and in basic mangrove ecology.

2. Enlisting free help from outside groups

Pred Nai has received a significant amount of support from outside organizations. During the phase of armed resistance to the outside organizations the national media began covering the events in Pred Nai. This national media exposure eventually led the Thai national government to look into the events in Pred Nai and soon after the corporations were forced to withdraw from the mangrove forest around Pred Nai. The RFD supported and assisted Pred Nai to conceive and draft their first formal management plan. Once RECOFTC became involved with Pred Nai in 1999, the NGO was able to provide a wide array of technical support to the community as part of their collaborative research program with Pred Nai. The assistance provided included: further development and revision of the management plan; assistance in networking with other communities; the establishment of linkages with university academics with research interests relevant to Pred Nai; as well as a wider dissemination of Pred Nai's success, including nomination for the 2004 Equator Initiative award.

3. Were there pre-existing relationships between these groups and the community?

The RFD had developed a relationship with Pred Nai dating back to the time of the village's conflict with the logging companies. Unfortunately, due to a lack of clear direction from provincial government officials (and some allegations of corruption) the RFD was unable to assist Pred Nai in stopping the illegal logging activities.

d. Knowledge

i. Sources of knowledge: local/TEK and/or outside knowledge

The knowledge used by the villagers of Pred Nai in the management of their mangrove forest is an interesting combination of both conventional scientific knowledge and local ecological knowledge. Local knowledge which is held by members of the community is commonly centered around the use or harvest of local resources but in many cases has been useful for conservation and management. Outside knowledge was brought to the community largely by NGOs

and government agencies involved with the community. Outside knowledge has largely been knowledge which is useful to the community, relating to reforestation, mangrove ecology, or other areas where the community asks for assistance. It is also important to note that knowledge is shared amongst communities involved in the various community forestry networks.

ii. If there is local knowledge and if relevant, who holds this knowledge?

Within the village, local knowledge is possessed primarily by the resource users. The local mangrove forests are an important economic resource for the village and they are utilized by a large number of the people for a wide variety of different resources, including: fish and aquatic wildlife, terrestrial animals, trees, plants and herbs. As a good deal of the local ecological knowledge present is utilitarian in nature it is possessed in varying degrees by the resource-users. Two groups of people in particular stood out in terms of the quantity and quality of ecological knowledge that they possessed; these were the village elders, and the crab collectors. The village elders, largely due to their years of accumulated experience, displayed a wealth of ecological knowledge and were often called on to help educate children and other villagers. Some elders within the village also possessed more specialized knowledge relating to medicinal uses of various local flora and fauna. The crab collectors' knowledge tended to be more utilitarian in nature, relating more to the harvest and utilization of mangrove resources.

iii. If there is outside knowledge used in the project, was there capacity building? Who was involved in providing capacity?

Outside knowledge was also an important component of the conservation and management program within Pred Nai. Capacity building has played an important role in transmitting outside, often scientific knowledge to the leaders of the conservation group and the members of the village. Capacity building has come in the form of both formal and informal training by government, NGOs and universities; as well as knowledge exchange between communities within the framework of formal community forestry networks.

Formal and informal capacity building has been provided by government departments, including the RFD, DMCR, Fisheries Department, the army; as well as NGOs such as RECOFTC. Community members have learned and developed skills in community forestry management, map reading, the use of GPS, reforestation and replanting, networking, report writing, patrolling, forest inventory and mapping, networking, as well as how to help educate and train other communities.

iv. Were there other ways of integrating knowledge systems?

The integration of conventional, scientific knowledge and local ecological knowledge has been important within Pred Nai Community Forestry Group. A

key component of this integration of knowledge systems is that the villagers have remained in control of their management plan, allowing them to utilize outside knowledge which is of use to them and which also agrees with their own knowledge and understanding of the mangrove forests.

Much of the local ecological knowledge within the community centers on locating, harvesting and utilizing local mangrove resources; however, some of this knowledge is also valuable for management. For example, the crab collectors knowledge of the breeding and life cycles of the economically important Grapsid crab led them to suggest a ban on crab collecting during the breeding/egg laying period of their life cycle in October/November. This highly successful rule was a direct result of the ecological knowledge and experience of the crab collectors. Local ecological knowledge also serves as a valuable source of hypotheses for research projects. For example, there are currently a number of collaborative research programs underway with NGOs such as RECOFTC, researching the effect of thinning mature areas of mangrove forest in order to increase Grapsid crab populations, and TRF (Thailand Research Fund), researching the effects of sea-fences and artificial rubber fish houses on reducing the rates of coastline erosion. In both of the examples given here the idea for the research as well as the hypothesis was brought forward by the community.

In the case of disagreement between scientific knowledge and local ecological knowledge it would seem that local knowledge is often given priority. An example of this is evident in a current disagreement between Pred Nai Community Forestry Group and the local office of the Department of Marine and Coastal Resources. The DMCR had begun a program of cutting and burning certain fern species in the mangrove forest in order to open up land for the replanting of species that they find more favourable. The conservation group disagreed with this approach and reached an agreement with the DMCR to ban burning in Pred Nai's mangroves and allow replanting only of non-forested or degraded areas. This example shows that although the villagers are open to scientific knowledge and new techniques/technologies, they do maintain control of their community forest and also use local ecological knowledge as a check against potentially harmful activities/research.

v. Were there learning networks?

The complex web of cross-scale linkages that exist around Pred Nai Community Forestry Group has led to some interesting formal and informal learning networks. Pred Nai Community Forestry Group is a member of a number of formal networks that exist at scales varying from sub-district, province, regional and national level. An important component of these networks is the sharing of knowledge and experience between communities, NGOs, and involved government departments. Within these formal networks it appears that it is often the relationships between the individuals, outside of the scheduled network meetings, which make significant contributions towards sharing of ideas and problem solving.

Informal learning networks also exist between Pred Nai and other communities with established or developing community forests. The success of Pred Nai has led them to host leaders from many other communities in order to teach them and to share experiences from their successful community-based conservation program. These informal relationships also tend to lead to greater participation in the formal networks.

3.2 Cross-scale linkages

- e. *Identification of main stakeholders by levels of organization.*
 - i. *local/community/village level*
 - ii. *regional administrative level: municipality, district, etc. as appropriate*
 - iii. *state/provincial level*
 - iv. *national, including national NGOs*
 - v. *international, including international development agencies*

See **Table 1** for a breakdown of the main stakeholders present in the project by levels of organization.

- f. *Institutional linkages related to the project*
 - i. *Produce a diagram indicating key linkages*

See **Figures 3-6** for network diagrams showing the development of the cross-scale institutional linkages in Pred Nai during different periods in the development of the village's conservation efforts.

- ii. *Key horizontal institutional linkages*
 - 1. *facilitating/enabling the project*

During the first period of Pred Nai's establishment, from 1982 to 1987, horizontal linkages were few but still of some importance. Many of the residents from other villages within the sub-district supported Pred Nai in their struggle to halt the exploitive activities of the outside corporations. To this end the villagers helped to apply pressure to force the corporations out through complaints to local government officials and participation in rallies at the provincial capital in support of Pred Nai.

During the period of informal management and patrolling in Pred Nai, there were no significant horizontal linkages present.

Since the formation of Pred Nai Community Forestry Group in 1998 onwards, horizontal linkages have become more common. Started on the initiative of Pred Nai's leadership, but with the assistance of RECOFTC and the RFD, the village conservation group began hosting leaders from villages all over Thailand. This allowed the visitors to learn about and from the organization and methods of Pred Nai Community Forestry Group. Another important mechanism for horizontal

linkages was the establishment of the Trat Provincial forestry network. This network, established by Pred Nai and RECOFTC, has been important in establishing and encouraging communication between communities within the province of Trat, allowing them to share knowledge and experience relating to community-based forestry management.

Currently, the number of horizontal linkages connected to Pred Nai has increased dramatically. The community operates an “eco-tourism” program allowing leaders from other communities that manage community forests or are beginning to manage community forests to come and see the program in Pred Nai and learn from their experience. The provincial level network also continues to function, still supported by RECOFTC, but there have been new networks begun at different scales as well. The original Trat province network has spawned a “4-province network” involving communities from across the four coastal provinces of Trat, Rayong, Chantaburi, and Chonburi. In addition, another network has been created with funding from the UNDP to encourage networking between the two sub-districts of Hung Nam Khao, where Pred Nai is located, and Ao Yai, the sub-district to the south. This network is interesting as it was likely necessitated by geography, the two sub-districts share a small peninsula (see **Figure 2**). All three of the current networks that Pred Nai is involved in are important forums for communication and dialogue between communities and, because of the large number of communities participating, facilitate easier and more equal dealings with national and provincial branches of concerned government departments.

2. Barriers/hindrances to the project


There were no linkages discovered by the researcher which hindered the project.

3. Whose initiative established these linkages?

The first formal network, Community Coastal Resource Management Network (CCRMN) at the provincial scale, was initiated by Pred Nai with the assistance of RECOFTC as part of the PAR project. The “4-province” network was spawned largely from the success of CCRMN, again with assistance from RECOFTC. The Tambon Hung Nam Khao and Ao Yai network was started through the initiative of leaders from neighbouring villages. The informal linkages were often initiated by Pred Nai’s leadership or through the guidance of either NGOs, such as RECOFTC, or government agencies, such as the RFD, who were able to send village leaders to Pred Nai in order to help them learn about community-based management.

Table 1: Cross-scale representation of community organizations and partners in Pred Nai Community Forestry Group (as of May 2005)

	Local	Sub-district	Province	National	International
PNCFG	X				
RECOFTC					X
CCRMN (Network)			X		
Tambon HNK & Ao Yai Network		X			
Tambon HQ		X			
TAO		X			
Village savings group	X				
Women's Group	X				
Village homestay group	X				
DMCR				X	
Royal Forestry Dept.				X	
Fisheries Dept.				X	
TRF				X	
World Bank					X
SIF				X	
Oamsin Bank				X	
Universities			X		
4-Province network				X	
Social Capital Development Office			X		
UNDP					X
Toyota Foundation					X
Wat Pilom		X			
CODI				X	
Royal Thailand Army				X	

X

 Level at which organization is based
 Level at which organization is active in relation to the Pred Nai project
 Level at which organization is not active in relation to the Pred Nai project

Note: There is a district level within the Thai administration, however, it was omitted from the table as it is noticeably absent of institutions, and in this case there were no significant linkages based at this organizational level.

iii. Key vertical institutional linkages

1. facilitating/enabling the project

During the initial stages of the project (see **Figure 3**), when the village was locked in conflict with outside corporations, the cross-scale vertical linkages were generally absent and those that existed were often weak or ineffective. Pred Nai's attempts to have the RFD enforce existing national forestry regulations which were being violated by the corporations was quashed as the Governor's office was in favour of the industrial development. Pred Nai's plight was finally given attention when a provincial government bureaucrat assisted the community to contact the media and bring their conflict to the attention of a national news audience. This forced the national government to become involved, and pressure was put on the provincial government to enforce the existing legislation and put a stop to the corporate logging and aquaculture developments taking place in Pred Nai.

From 1988-1997 (**Figure 4**), during the period of informal patrolling, vertical institutional linkages were largely absent from the conservation group. The community was largely on its own, content to protect their mangrove forest from internal or external exploitation. Only two vertical linkages of any consequence existed at this time. The first was between the informal patrol group and the RFD. The RFD provided some support to the patrol group and often assisted by arresting or fining individuals that the patrol group caught for offences in the mangrove forest. The other significant vertical linkage was the intervention of a monk from Wat Pilom, a Buddhist temple located in the provincial capital. The monk came to Pred Nai and helped them to establish their village savings group and also taught the villagers more about conservation.

The establishment of the Pred Nai Community Forestry Group in 1998 as a formal management group coincided with a large increase in the establishment and development of important vertical institutional linkages (**Figure 5**). The first important linkage was established in 1999 with the Social Innovations Fund (SIF), administered by Oamsin Bank who provided funding to Pred Nai in order to buy patrol boats, build a walkway through the mangroves, and build a cabin for patrol groups to stay over night. After Pred Nai received funding from SIF, members of the NGO RECOFTC learned about Pred Nai and began their longstanding and fruitful relationship. In 2001 RECOFTC began their Participatory Action Research Project in partnership with Pred Nai, which was funded by the Toyota Foundation. This proved to be an important step for the conservation group, marking the beginning of formal research in the mangroves, further development of the village's management plan, and in 2001 the establishment of the Trat Provincial Forestry Network. Pred Nai has also received training and assistance in patrolling their mangroves from locally stationed army units, the local police force and the coastal police, with some training also provided by the RFD and the fisheries department. The RFD and Fisheries Department were also involved in

more significant ways; the former in providing saplings for village reforestation efforts, and the latter by stocking young aquatic wildlife (shrimps, crabs and fish) into the canals of the local mangroves.

As the project has become more established, the number and importance of vertical institutional linkages present in the project has increased accordingly (see **Figure 6**). At the Tambon, or sub-district, level there are two important linkages. First, with the TAO (Tambon Administration Organization) a sub-district level government organization recently created in order to assist with decentralization and act as an intermediary between local villages and national level government agencies. The second important sub-district level institution is the Tambon Hung Nam Khao & Ao Yai Network. This network, established in 2004, is funded by the UNDP (United Nations Development Project). In addition to the networking between communities, the primary goal of the Hung Nam Khao & Ao Yai Network is reforestation within the two sub-districts. Pred Nai's section of the sub-district is largely forested and Pred Nai's role in this network is principally advisory. At the provincial level, Pred Nai is in contact with numerous government agencies, the RFD, the Fisheries Dept. and the newly created DMCR (Department of Marine and Coastal Resources). The Fisheries Dept. and RFD have largely continued their role with Pred Nai, with the notable difference that the DMCR, which was created in 2002, has now assumed legal responsibility for the management of mangrove forests in Thailand. The other significant linkage at the provincial level is the "Happy Communities Project" created by the Social Capital Development Office, a non-profit, private NGO which operates in numerous communities in Thailand and is funded by the national Health Department of the Thai government (This project is discussed in greater detail in section 1.g). Another significant national level linkage with Pred Nai is from the TRF (Thailand Research Fund). The TRF was established by the national government in order to provide funding for research, and their current focus is on community-based research and the local environment. The TRF has established and funded numerous research projects which involve partnerships between university researchers and rural communities. Pred Nai is currently involved in a project with the TRF investigating local shoreline erosion and assessing methods of controlling it including the construction of off-shore bamboo "fences" to keep boats further from shore and fish houses constructed out of old tires in order to slow the movement of waves and wake from boats. There are numerous universities involved in Pred Nai, some of which are involved with the TRF project, while others are there to conduct their own research or to learn from Pred Nai. University participation varies in scale from individual students to entire classes. An additional linkage which is still in the planning process is a project initiated by the national office of the DMCR to build artificial coral reefs from large concrete blocks, in order to control coastal erosion, provide fish habitat and prevent fishing trawlers from coming too close to shore.

Although the participatory action research project has ended, RECOFTC has remained an important partner for Pred Nai, remaining in direct, regular contact

with the community and assisting them with conservation and management issues that arise. RECOFTC also remains actively involved in the Trat provincial network that they assisted Pred Nai in establishing. There has also been a new, national level network created. This “four-province” network received funding from Community Organization Development Institute (CODI) and aims to establish and strengthen communication between the provincial networks of four provinces in southeast Thailand (Trat, Chantaburi, Chonburi, and Rayong). This new network includes many communities from Thailand involved in managing their local forests and also sees the involvement of many national-level government departments from within the Ministry of Natural Resources: DMCR, RFD, and the Fisheries Department.

2. Barriers/hindrances to the project

There were no linkages discovered by the researcher which hindered the project.

3. Whose initiative established these linkages?

The establishment of the linkages is discussed in Section 3.2, f, iii, 1; along with the nature of the linkage.

iv. How does the policy environment impact the project?

Thailand is currently at a crossroads in terms of the legal status of community-forestry in the country. The national legislature is currently working on a Community Forestry Bill which will provide concrete legal status and a framework for all existing and future community-based forest management projects. As the bill is still in development it is currently under debate on whether mangrove forests will be included within the forestry bill. If mangrove forests are excluded from the final community forestry bill Pred Nai’s mangrove forests may be endangered as the conservation group would lack official recognition and legal authority and the mangrove forests would likely be classified as “non-forested” land which is then more vulnerable to commercial exploitation and degradation.

v. What change (if any) did the project trigger in government legislation or policy?

The success of Pred Nai appears to have improved the opinions of many local government officials towards community forestry. In Thailand, however, all policies are set at the national level and the community’s success, although recognized by some, has not had as wide an impact at the national level. Even as the government of Thailand is currently drafting legislation concerning Community Forestry, politicians are divided between those in favour of community-forestry, those that are afraid that local communities currently cannot handle the responsibility of managing local resources sustainably, and those that want to utilize natural resources for corporate extraction and development as they believe it to be better for the economic development of the country.

Despite the imminent implementation of the National Community Forestry Bill many politicians are against delegating any authority to communities out of fear

they will overexploit the land and resources. As the finalized version of the law has not yet been passed it remains to be seen how it will impact Pred Nai's conservation and management efforts.

g. Are there any unusual interactions among gov't agencies, NGOs, development agencies, etc, that impact the project positively or negatively? What motivates these linkages? What are the drivers of positive or negative interactions?

One interaction that struck the researcher as being unusual existed between Ban Pred Nai and the Social Capital Development Office, a provincially based NGO (see **Figure 6**). This linkage was unusual for two reasons. First, whereas, many social and economic development projects target communities with the assumption that the benefits will trickle down to the individuals, this particular project was aimed at the household and individual level with the assumption that the aggregated benefits from individuals and households would eventually be seen at the village level. Second, this project, funded by government and administered by a private non-profit NGO, attempts to reintroduce traditional Buddhist values as a means of improving economic and social welfare.

The relationship between these two groups was manifest in the "Happy Communities Project" funded by the national government and administered by the Social Capital Development Office. This ambitious project is multi-faceted and aims to improve the lives of individuals and households in rural villages in Trat province. The four facets of this project are diverse and include: individual self-improvement in-line with Buddhist principles, household budgeting, planting of organic "kitchen gardens" (growing herbs and vegetables for household use to minimize expenses), and planting of trees around the house and yard for lumber (domestic use or for sale).

International

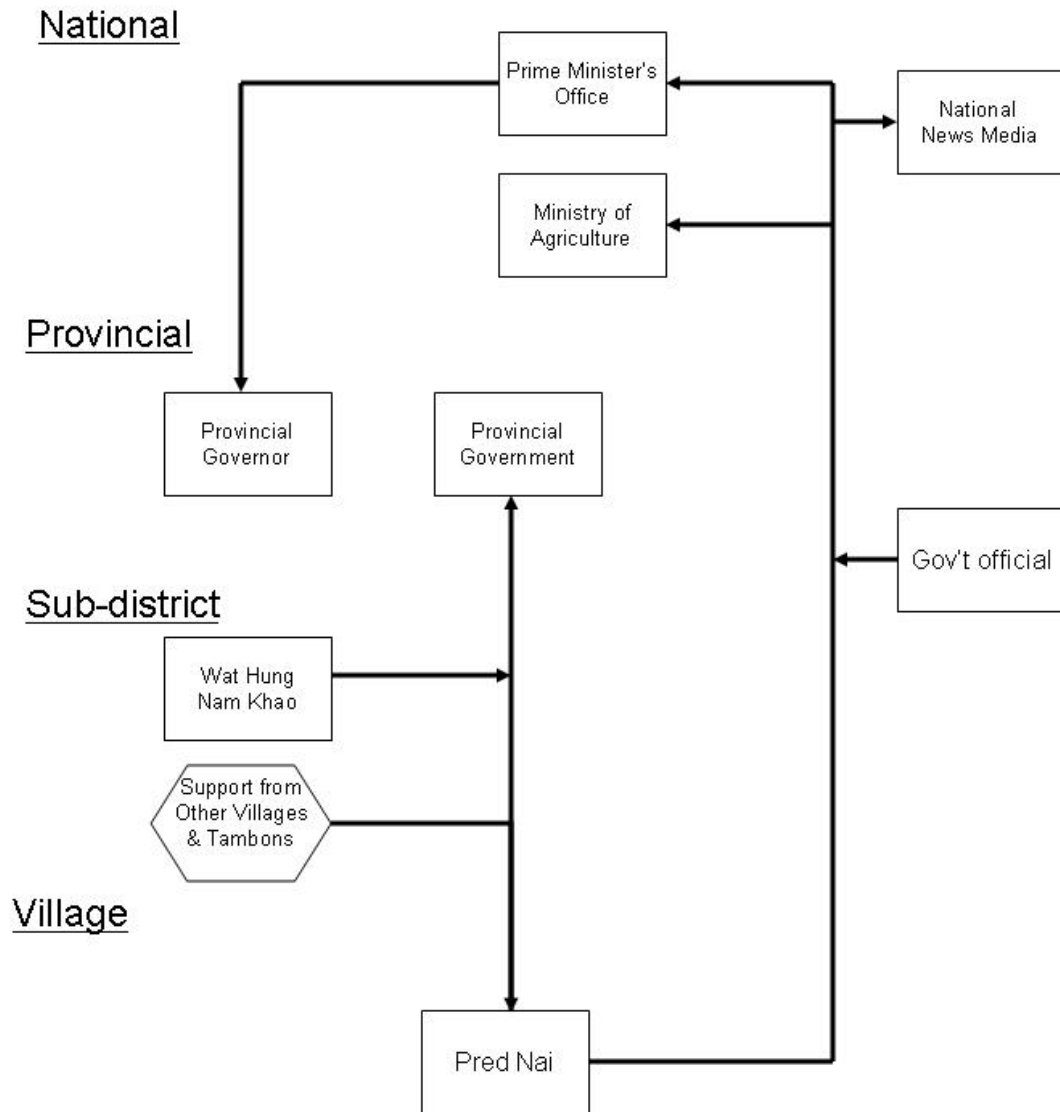


Figure 3: Network diagram showing institutional linkages during the initial stages of conflict (1982-1987)

International

National

Provincial

Sub-district

Village

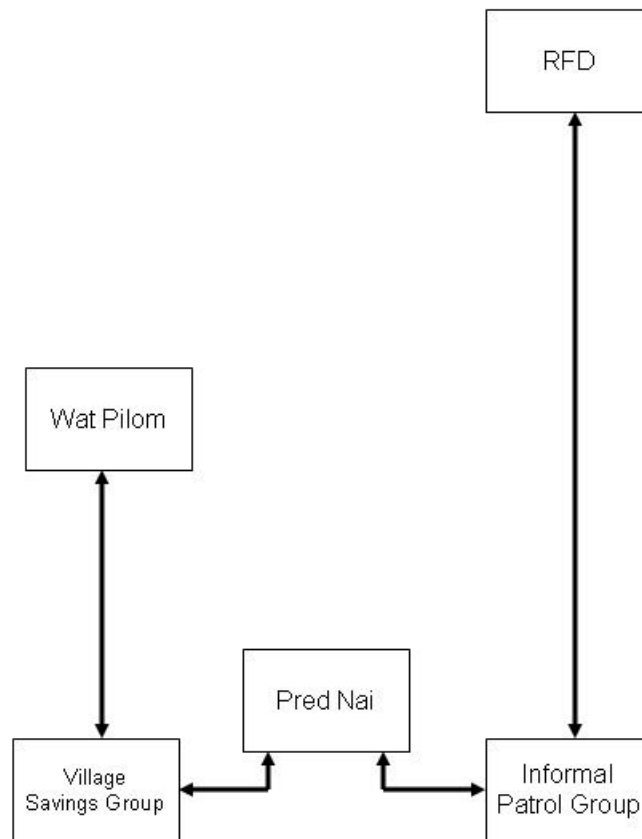


Figure 4: Network diagram showing institutional linkages during informal patrolling (1988-1997)

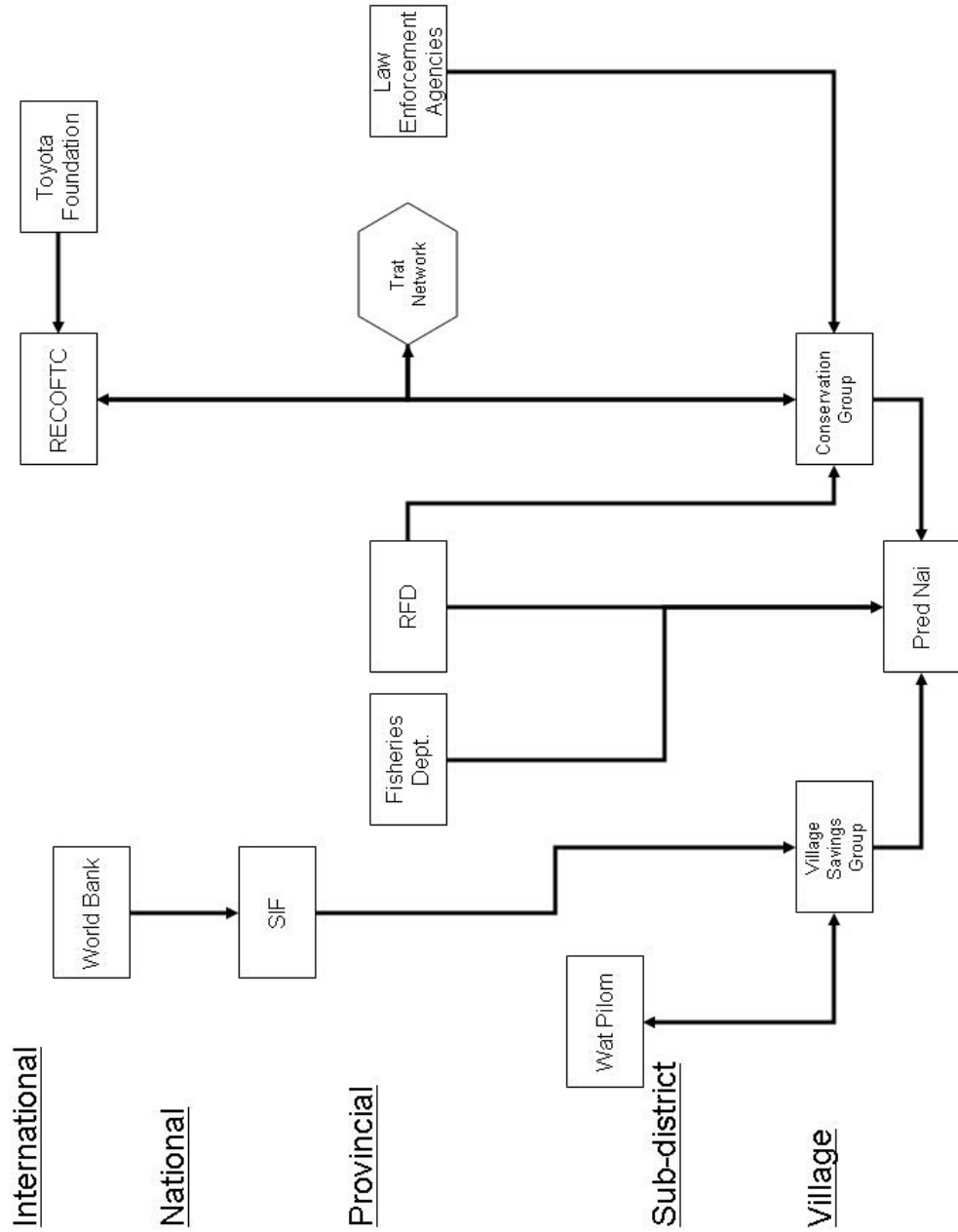


Figure 5: Network diagram showing institutional linkages during the beginnings of formal management (1998-2002)

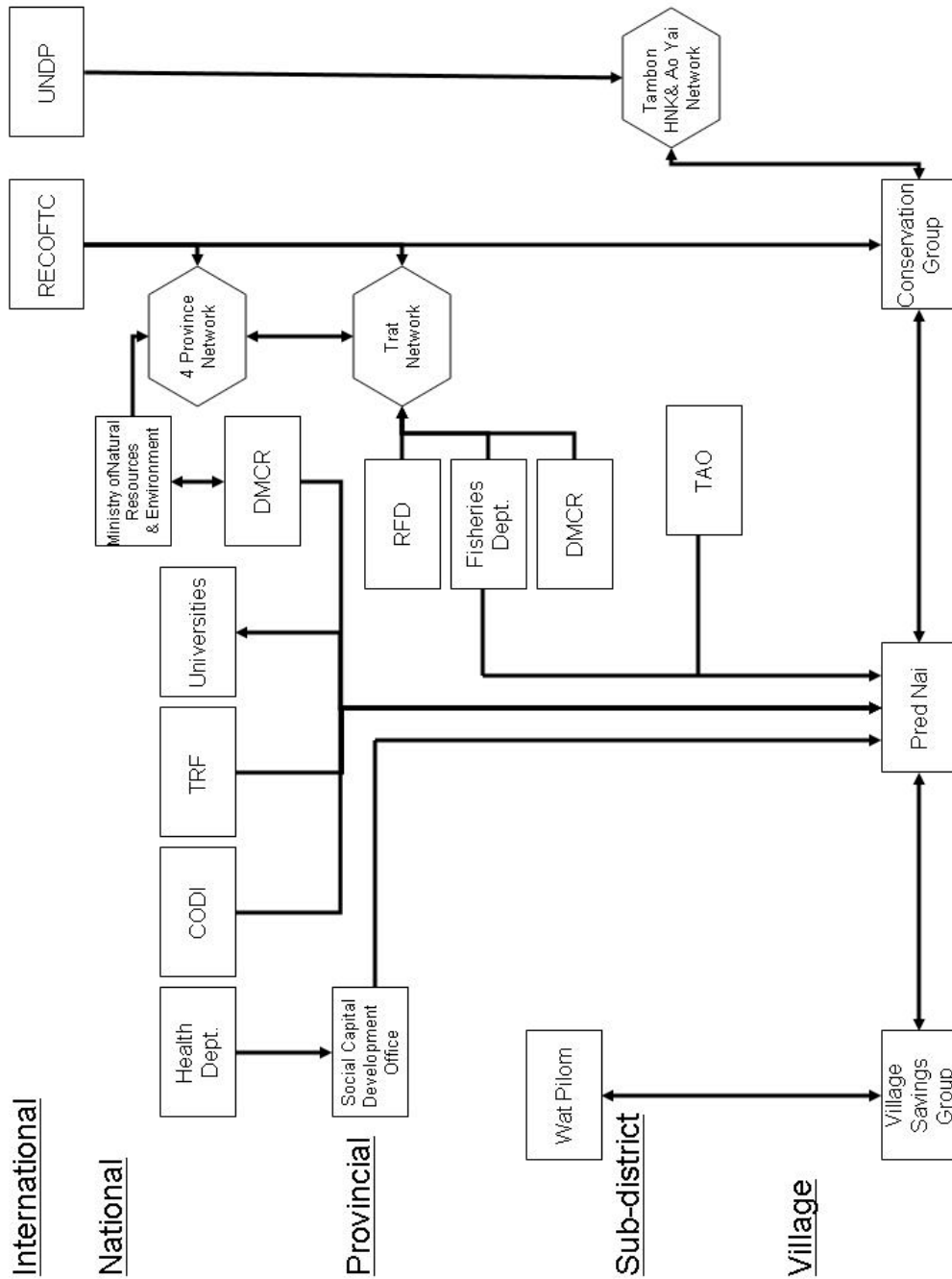


Figure 6: Network diagram showing institutional linkages during recent years (2002-Now)

3.3 Biodiversity conservation and environmental improvements

h. Conservation/improvement of what target resources

Overall, Pred Nai Community Forestry Group has been successful at conserving their local mangrove forest. The efforts of the village are two-fold. First they put a halt to the destructive activities of logging and shrimp farming which threatened to destroy the local mangrove forest and the terrestrial and aquatic wildlife that depend upon the mangroves for habitat. The results of their efforts can be clearly seen in **Figure 2**; the mangroves to the west of Pred Nai are the only significant forested area in the region. Secondly, the village has implemented various conservation measures, such as: the ban on crab collecting during the spawning season; the ban on logging; banning harvest in degraded areas to allow for regeneration; and restoration measures, such as reforestation, which have helped to improve environmental quality.

Successful conservation and restoration of the mangrove forest has benefited many species of marine and terrestrial wildlife. Villagers have reported the return of many species which had been absent since the beginning of logging and the appearance of new species, never previously seen. In addition, virtually all species which are harvested have increased in number despite an increase in harvesting pressure, thus indirectly indicating that the habitat is regenerating and environmental conditions are improving.

Despite their success in conserving the mangrove forests, the conservation group has been less successful in attempts to conserve offshore and marine resources. According to the villagers, one problem facing the village is large trawlers which often violate national fisheries laws by fishing within three kilometers of the shoreline. When fishing inshore the heavy nets of these boats destroy the sea bed, key habitat for many shellfish and crustaceans. The wake from these large boats also contributes to faster erosion of the shoreline. The conservation group has taken numerous steps to alleviate this problem, including: patrolling the coastal area along with people from neighbouring villages; building bamboo “fences” offshore in order to force the boats farther out and to slow their wake; and the construction of artificial habitat, locally called “fish houses”, from old tires or concrete in order to slow erosion and provide alternative habitat for marine life. The villagers indicated that their efforts, especially the fish houses, are seeing some success, but large trawlers remain an important source of ecological problems in the region.

Pred Nai Community Forestry Group has also taken steps to eliminate the use of fish traps or nets with small mesh sizes. The conservation group has run into difficulty, however, when attempting to implement this rule, as a neighboring community from a different sub-district, which borders the mangroves to the north, has received permission from the provincial government to utilize fish traps with a small mesh size. This exception was granted by the government as a compromise, allowing the villagers to earn a living while stopping them from illegally logging the mangroves for charcoal production.

i. Changes in resource state

There have been no formal scientific studies which quantify the changes in the mangrove forest or the state of any specific resources at Pred Nai. An informal forestry survey was conducted by Pred Nai Community Forestry Group in partnership with RECOFTC near the commencement of their relationship, but this was done after the conservation efforts of the village had already begun. There is, therefore, a lack of baseline data which would allow for a quantitative analysis of the changes in the state of the mangrove forest and associated resources.

Although there is no formal scientific data available, the villagers reports of changes in their harvest can be used as a proxy for population levels. For example, the changes that have been recorded in the average harvest of aquatic wildlife such as Grapsid crab and Giant Mud Crab (*Scylla serrata*) are an excellent indicator of the population increase within these important species (see **Table 2**). Thus, monitoring of populations can be done informally simply through harvesting the wildlife. These numbers, although unofficial, are easy and inexpensive to obtain, easy to understand and also show the results of conservation in terms that are important to the livelihoods of local people. The data from local harvests indicate that populations of many of the economically important species are increasing. These increases are due largely to the effects of habitat restoration, regulations banning harvest during spawning periods, and restrictions on the size of animals harvested.

Table 2: Improvements in the harvest of key species

Type	Year 1998	Year 2003
Grapsid crab	8 kg/day (50 Baht = \$1.25 USD/kg) (6 collectors)	15 kg/ day (40 Baht = \$1 USD/kg) (30 collectors)
Mud crab	10,000 Baht (\$250 USD)/ 1 crop / 3 months / 1 family (6 cultivators)	15,000 Baht (\$375 USD) / 1 crop / 1 family (20 cultivators)
Clams	5 kg / day (25 Baht = \$.063 USD/kg) (5 collectors)	6 kg / day (30 Baht = \$0.75 USD/kg) (10 collectors)

Source: Building local capacity in forest and natural resources management, RECOFTC, 2004.

In addition to efforts to protect the existing mangrove forest the villagers have also been actively involved in assisting with natural regeneration. The first reforestation took place in 1987 after the successful expulsion of the corporations. This first reforestation was highly informal, carried out with no outside support. The villagers gathered shoots from trees in other parts of the forest, and replanted areas that were most in need of regeneration. After the formation of Pred Nai Community Forestry Group, the village's reforestation efforts were often given

assistance from both government agencies and NGOs in the form of seedlings to replant, as well as material and technical support.

Thanks to their efforts in conservation and reforestation, Pred Nai stands out from most other coastal sub-districts and even other villages within the same sub-district due to the large, contiguous area of mangrove forest that remains. In many other sub-districts what little mangrove forest that remains exists as thin patches right on the coast, often less than 50 metres in width.

j. Indicators of biodiversity conservation or improvement

The lack of any solid scientific measures of biodiversity conservation or environmental improvement forces us to rely upon indirect indicators of biodiversity conservation.

An important source of data about the changes in environmental condition comes from the qualitative observations of the villagers themselves. The villagers have noted that many existing species have increased in numbers and many more distinct species have returned to the mangroves including crabs, fish, birds, bats, monkeys, tree frogs, wild honey bees, and fireflies. Some of the specific species which were identified to the researcher as returning to the local area include: Spider crabs (*Dorippe dorsipes*), mudskipper (*Boleophthalmas boddarti*), and Crab-eating Macaque (*Macaca fascicularis*). Although it was difficult to identify individual species, one crab collector summarized the enhanced species richness present in the mangroves thus: “There are many more interesting birds now”.

It is also important to note that the return of the mudskipper (*Boleophthalmas boddarti*) and firefly are important for another reason. Both species were identified by the villagers as species which can only survive in clean, pristine environments. Thus, these species may serve as important indicators ecological health and integrity.

Another observation by villagers that indicates that the local environmental conditions have improved included numerous villagers commenting that various economically important species of crab, fish and shrimp are more abundant and easier to catch. Many of the crab-collectors also remarked that they were now seeing many young crabs, and that this was a good sign for future productivity.

k. Was there any reduction on threats to biodiversity?

The efforts of the conservation group have also resulted in fewer threats to biodiversity. One of the most significant steps taken to preserve biodiversity was the cessation and banning of intensive shrimp aquaculture in Pred Nai. Intensive shrimp aquaculture is notorious for releasing large quantities of chemicals into nearby waterways, eventually polluting areas past hope of restoration. By eliminating all intensive shrimp farms from their village, and banning the establishment of more shrimp farms Pred Nai has taken an important step towards protecting their local resources.

Pred Nai Community Forestry Group's persistent patrolling of the mangrove forest has also been important in protecting biodiversity. Their efforts at patrolling have drastically reduced the illegal harvest of trees from their mangrove forest, have ensured that outsiders who come to harvest Grapsid crab from their forest obey the conservation group's rules regarding harvest, and helped in reporting fishing trawlers that fish within the three kilometer boundary.

Pred Nai has been active in both educating other villages about the need for conservation and teaching them about the process of establishing their own community forestry program. By sharing their knowledge and experience with other communities and assisting in initiating new conservation programs Pred Nai has played a role in reducing the threats to biodiversity at a scale beyond that of their village. This accomplishment is particularly significant when it is considered that it is the recognition of the importance of conservation, especially in the face of poverty, that is often the most difficult step towards sustainable development in rural areas.

3.4 Poverty reduction

1. Indicators of poverty reduction

The first and most clear indication of poverty reduction was the increase in crab harvest which improved the livelihoods of the village crab collectors. The increase in populations of the Grapsid crabs is even more significant when it is considered that the number of full-time crab collectors, and thus harvesting pressure, more than doubled during the same period that saw the average yields per harvester double. This amounts to roughly a four-fold increase in productivity. The local conservation efforts also had an impact on the populations of other economically important flora and fauna, such as shrimp, fish, and lizards but these species were less important economically. In addition, the increases in harvest numbers for other species were not as dramatic, and they were not as well documented as the Grapsid Crab.

After the construction of the seawall in 1984, the villagers in Pred Nai gradually converted their rice fields into semi-intensive shrimp aquaculture ponds. In the short term, the shrimp ponds proved to be highly profitable for the villagers. In the long term, however, disease, and increasing input expenses combined with a falling export price for shrimp led to narrower profit margins and the eventual failure of the industry in the mid 1990s as expenses outgrew revenues. Intensive shrimp aquaculture within the village was eventually banned by the conservation group in 1998 but by this time most shrimp farms in the village had already ceased operation. Although they were unable to return to a rice-agriculture system, the villagers were able to successfully transition from shrimp aquaculture to a fish aquaculture system, raising primarily Grouper (*Epipephelus malabaricus*) and Sea Bass (*Lates calcarifer*). This shift from shrimp to fish

aquaculture resulted in incomes that were more stable and at a lower risk of total failure, as compared to intensive aquaculture.

Pred Nai Community Forestry Group, in partnership with the provincial office of the Fisheries Department, also constructed a holding area for spawning mud crabs, locally called a “mud crab bank”, in order to increase villagers’ incomes. The villagers initially thought of this project in order to help increase the numbers of crabs available for harvest. They requested the fisheries department to provide nets so that they could create an enclosure within one of the canals in the mangroves. After the creation of the enclosure, whenever villagers would catch gravid mud crabs or swimming crabs in their traps they would move the crabs to the enclosure. Within the enclosure the crabs were able to spawn and the movement of the water in the canals allowed the larvae to spread out naturally, thereby increasing populations. In addition, the villagers were still able to harvest the mature crabs after the spawning period with no loss in terms of their livelihood.

m. Improvements in community well-being

The establishment of the Village Savings Group within the village has been another important accomplishment in terms of poverty reduction. Established with the help of a local Buddhist monk in 1993, the village savings group was set up to allow villagers to purchase a pre-arranged number of “stocks” each month at a set price. Villagers are limited to purchasing a maximum of 50 stocks/month/member of the household and must purchase the same amount each month over a year. Thus the savings group acts as a forced-savings mechanism encouraging villagers to save money. Interest payments are paid out to the stockowners every 6 months, allowing them to make a small but secure amount of money from their savings. Once villagers reach 40,000 baht in stocks (approximately \$1,000 USD) they are then permitted to begin withdrawing money from their savings.

The Savings group also functions to provide low-interest (currently set at 1%) loans to community members for social or economic development projects. A committee of 14 villagers operates the savings group and makes decisions approving or denying loan applications received from villagers. The priorities for approving loans are education and healthcare, with an emphasis on treatment of illness; but loans may also be provided for agricultural improvement projects or other projects deemed to be valuable to the village. Thus, while not directly improving incomes in the community, the Village Savings Group has functioned to improve social welfare and economic development, subtly assisting with income redistribution in the village (the wealthy tend to buy more stocks/month and the poorest villagers can receive low interest loans for development) and to encourage savings within the village. Participation in the savings group has also helped villagers to improve their money management skills within their households.

There are also currently two different tourist ventures operating in Pred Nai. An agro-tourism promotion program by the provincial government aims to attract visitors to the various agricultural locations within the Tambon (sub-district). Government placed signs point out fishponds, different types of fruit plantations, and agricultural processing centres within the sub-district.

The more significant tourist venture is an informal tourism program run by the Pred Nai Community Forestry Group. Pred Nai operates as an important learning center, hosting leaders of other communities, government officials, NGO representatives, and university students. These visitors come to the community to learn about community-based conservation and management from the experienced leaders and membership of the Pred Nai Community Forestry Group, as well as about mangrove ecology. Although the villagers have taken to calling it eco-tourism, in reality it is about the learning and sharing of experience and knowledge. The amount of visitors to the village is relatively small but they are generally housed and fed in the homes of villagers through a home-stay program which sees households take turns as hosts. The guests pay a small amount of money per night and the hosts retain 75 percent of the money, while the other 25 percent is given to the conservation group to help fund expenses such as fuel for patrol boats. When large groups of students come from universities or schools they are generally housed within the community centre and fed by the service section of the conservation group (the conservation group is organized into numerous patrol groups and a service group, responsible for hospitality), with all money paid directly to the conservation group.

The success of Pred Nai has also contributed to an overall feeling of well-being and pride within the community. The villagers are proud of their accomplishments in conservation and, at least within the NGO and government communities, are quite well known in Thailand. The “eco-tourism” program provides a further sense of pride within the community as outsiders come to learn from the community members.

n. Was there any reduction on threats to human well-being?

One of the important human impacts of the conservation group has been a reduction in methamphetamine drug use among crab collectors. Formerly, in the days when crab populations were lower, crab collectors would work a full night, from approximately 9 pm to 4 am, harvesting crab in order to earn a living. It was reported by some of the crab collectors and villagers that methamphetamines were commonly taken in order to give crab collectors the energy and alertness necessary to engage in this harvest all night long. Now that crab populations have increased, due to the conservation efforts of Pred Nai Community Forestry Group, crab collectors are able to harvest approximately double the amount of crab in only a half-night of collecting. This has led to a halt in methamphetamine use for crab collecting which reduces the threats to the health and welfare of the crab collectors.

Mangrove forests, in addition to their ecological value, provide an important natural barrier against wind, waves, and tsunamis. The maintenance of the mangrove forest around Pred Nai provides the village with a measure of protection which is difficult to quantify. The daily protection that the mangrove forests offer against damage and wear to the village; infrastructure, such as power lines and roads; as well as agricultural developments such as fish ponds, fruit gardens and rubber gardens is immeasurable. When considered in light of the recent tsunami in Southeast Asia the importance of these natural barriers during tsunamis and other natural disasters is further highlighted.

The conservation of the local mangrove forest has also ensured that there are more livelihood options available to villagers now and in the future. If consumer demand shifts away from Grapsid crab the mangrove forest supports a wide variety of flora, fauna and other resources which may be harvested or utilized for income. In other words, the maintenance of biodiversity has acted to promote the economic resilience of the community, providing more options for future economic development in the face of change.

3.5 Detailed analysis of community-based conservation (CBC)

o. Mechanisms, dynamics, drivers

i. Analysis of catalytic element that made the initiative work

Pred Nai's grassroots origin and on-going strong community support are one of its important strengths and a key factor in the community's success. The involvement of outside NGOs and government agencies, RECOFTC in particular, has also been an important contributing factor to the community's success. RECOFTC's contributions to Pred Nai's conservation and management program are multi-faceted and diverse. They include new initiatives, such as the forest survey and the establishment of the Trat Province Forestry Network, as well as helping to expand and develop initiatives that Pred Nai had begun on their own, such as the village management plan and the "eco-tourism" program. Through their involvement RECOFTC has helped to provide training and capacity building for members of the village and also helped to provide key contacts for village leadership within government, academia, and NGOs; which have further assisted the village in achieving their conservation and management goals. It is likely that Pred Nai would have been successful in conserving their local mangrove forest on their own, but RECOFTC has acted as an important catalyst in helping Pred Nai Conservation Group to achieve its goals and to continue to develop and expand its conservation efforts.

ii. Decision-making process

An important element of Pred Nai's success in community-based conservation lies in the grassroots nature of their conservation group. As such, all major decisions made by or within the conservation group are done with the participation of villagers at meetings. The leaders of the village and conservation group are, for the most part, well respected within the community and due to their

knowledge and experience, and the patriarchal nature of Thai society; their advice is often followed when choosing courses of action for the conservation group.

The leadership of the village and conservation group is important in meeting with representatives from government, NGOs and other communities; however, decision-making power has remained largely in the hands of the villagers. Leadership also retains control over the day-to-day operations of the conservation group, although since there is no formal infrastructure in place this is minimal.

iii. Conflict-management mechanisms

Within Thai culture conflict is generally avoided as conflict leads to a loss of face amongst participants. This is not to say that conflict does not exist between different stakeholders within the village, however, disagreements and conflict between fellow villagers are generally kept low key and often out of open view. For example, there has been a long-standing, low-intensity conflict/disagreement between two key leaders in Pred Nai; however, this animosity has not prevented them from working in the best interests of the village, often cooperating in order to pursue common goals. There does not appear to be any formal conflict-management mechanisms in place, but because Thai culture frowns upon conflict it has been kept rather low-key and, over time, the two leaders have built a mutual respect and understanding for each other.

Conflict between villagers and outside stakeholders is more common and often more acute. Currently, there are two existing conflicts between Pred Nai Community Forestry Group and two outside stakeholders. The first is with in-shore fishermen whose large trawlers are destroying the seafloor and accelerating shoreline erosion from the wake of their large boats. The leadership of Pred Nai has attempted to negotiate with these fishermen on behalf of the conservation group, encouraging them to obey the existing laws which prohibit these fishing boats operating within three kilometers from shore and attempting to negotiate a solution to their conflict. Unfortunately, these attempts have been in vain and the villagers have worked in conjunction with the responsible government departments, coastal police and Fisheries Dept., in order to patrol coastlines and report any violation of the rules, but with limited success. The second ongoing conflict exists between the conservation group and a group of people living in the sub-district north of the village, bordering the mangrove forest. These people have been using fish traps with a small mesh size in the river which forms the boundary with Pred Nai's section. The rules of the conservation group forbid the catching of small fish (<18-22 individuals/kg) (Pred Nai, 2003) and Pred Nai villagers were very upset by their neighbour's indiscriminate harvest, this led Pred Nai's patrols to destroy any "illegal" fish traps that they found. The government intervened in order to prevent further conflict and has begun funding a program to help the neighboring villagers to begin new livelihood endeavours and in the interim has sanctioned their use of the illegal traps.

iv. Conflict resolution and enforcement

When conflicts arise within the conservation group they generally occur over the approach used to solve problems. Conflicts within the conservation group are generally overcome by talking the issue out at meetings. The villagers attempt to reach a consensus and if this is not possible the majority opinion is followed.

p. Learning and Adaptive Management

i. How did previous observations lead to project formation and development?

The previous experiences of the village during the informal management of the mangrove forest appear to be absolutely critical to the formation and development of the formal conservation group. The villagers' experiences with management through the informal patrol group stimulated the formation of and heavily influenced the structure and composition of the formal management group.

After formation of the formal management group and the beginning of contact with RECOFTC, some of the key leaders from Pred Nai participated in a study tour to other, well-developed community forestry sites around Thailand. The leaders were able to learn more about the various approaches and problems involved in community-based management. The Pred Nai leadership was so influenced by this RECOFTC-sponsored trip that it helped to inspire Pred Nai to begin their own "eco-tourism" program in which the village plays host to leaders from other communities in order to instruct and share information about community-based management.

ii. How was experience incorporated into subsequent steps of the project? What learning processes did the different parts of the project go through?

One of the key lessons learned from this project was that experiences from various stages in the project's evolution seem to influence the success of Pred Nai in later stages. For example, the community's experiences running the village savings group and from their informal patrolling of the mangroves helped to develop and improve the later success of the formal conservation group.

Another example of learning processes is evident in Pred Nai's use of different approaches to solve the problem of the fishing boats coming too close to shore. The village experimented with different approaches. For example, the village originally attempted to talk with local fisherman and try to convince them to obey the law and stay three km out from shore. When this approach failed the conservation group tried different approaches, including: constructing bamboo fences in order to keep the fishing boats further out, patrolling with law enforcement authorities to catch fishing boats fishing illegally within the three km boundary, and constructing fish houses in order to arrest the erosion of the shorelines.

iii. What was the role of experimentation, if any?

Pred Nai has been involved in both formal and informal experimentation which has helped to shape their organization and management decisions. Formal experimentation has come in the form of collaborative research projects with universities and RECOFTC. For example, Pred Nai is currently collaborating with RECOFTC to determine the impact of thinning the mangrove tree density on the productivity of mangrove crabs. Formal experimentation in this manner can provide information and knowledge that the conservation group can utilize when determining rules and restrictions for resource use. Pred Nai is also involved with the TRF in a program researching the effectiveness of different methods in mitigating shoreline erosion caused by large fishing boats.

Informal experimentation has been conducted largely in an organizational sense. For example, Pred Nai began their “eco-tourism” project and hosted leaders from other communities without any certainty that this program would be successful in assisting other communities. Many of the conservation measures and rules instituted by the conservation group were also done in an experimental sense because they were often unsure of their outcomes. The actual organizational structure of Pred Nai Community Forestry Group has also undergone small changes in the number and placement of leaders as well as the number of patrol groups set up.

iv. How monitoring informs the project

Ecological monitoring has played an important role in Pred Nai’s conservation efforts. The principal means of data collection is by monitoring harvest numbers of species such as Grapsid crabs and other economically important species. This data is obtained by the crab collectors and crab buyers and is reported to the conservation group.

Another important source of monitoring is qualitative observations from resource users and people who are out on the land more frequently, such as crab collectors. They have contributed observations about the ease of catching certain species of fish, and shellfish; the numbers of young observed; and the total numbers of individuals from species observed.

This qualitative and quantitative ecological data has provided important feedback to Pred Nai. Local ecological monitoring has kept the conservation group informed about the situation “on the ground” and has allowed the village to observe the positive ecological changes that their conservation measures have produced. Conversely, if the observations of local people indicate that populations of harvested species are decreasing it may provide sufficient warning for the conservation group to act to address the situation and arrest the negative change.

v. Barriers to community-based conservation, and how the barriers were overcome

The most significant barrier to community-based conservation faced by Pred Nai was the fact that unlike many other community-based cases, their project was initiated by locals who had no prior experience with conservation and, initially, had little in the way of outside support. This barrier was overcome largely through the determination and unity of the villagers of Pred Nai coupled with the strong leadership of key individuals in the community. Their combined will to ensure that local resources were conserved and used wisely ensured that the village rallied behind their local leaders and took small practical steps to ensuring local conservation efforts.

A second significant barrier to Pred Nai's conservation efforts was a lack of funding at the outset of the village's informal conservation efforts. To the eyes of many outsiders this obstacle would seem largely insurmountable; however, the villagers of Ban Pred Nai banded together and implemented local conservation rules and measures which were then enforced through social pressure as well as through the efforts of the volunteer patrol group. The village was realistic and pragmatic and took steps which they saw as necessary and achievable in order to conserve the resources that they relied upon. In addition, Ban Pred Nai's experience with the village savings group helped build credibility and assisted the village in obtaining funding after their conservation group was formally established.

vi. Combining knowledge systems to solve problems

The Pred Nai case presents an interesting example of the integration of conventional scientific knowledge and local ecological knowledge. Pred Nai Community Forestry Group has, since its inception, shown a great interest in technical and academic support/training often preferring this form of support to financial support in the form of direct funding. This thirst for knowledge is further borne out by the many linkages that Pred Nai has formed with important knowledge partners such as the TRF (Thailand Research Fund), RECOFTC, and universities across the country. It is also significant that knowledge transmission between partners is never one way, in all cases observed and discussed there is mutual sharing of knowledge and experience.

The practical integration of the two knowledge systems is visible in many forms. In their partnerships with RECOFTC the village has provided hypotheses for research projects, such as the current project examining the role of thinning areas of mangrove to see the effect on Grapsid crab populations. With the guidance and assistance of the RECOFTC staff the conservation group has taken the role of conducting the research and gathering the necessary data. This relationship has further evolved with the TRF who has provided funding and technical support to assist Pred Nai in studying various methods of keeping fishing boats away from shore and minimizing the effects of erosion on the shoreline (bamboo fences and fish houses made of tires). Pred Nai's work with universities has principally been in the other direction, where groups of students or academics come to the village principally to learn from the community and the conservation group about

mangrove ecology and successful community-based management. The researcher also observed a few examples where researchers from Thai universities conducted fieldwork in Pred Nai and the results of these studies were generally shared back with the community in order for the community to derive benefit from the research.

q. Community benefits from biodiversity conservation and environment improvements

i. What direct benefits were observed

The principal benefit that the community has realized is the stabilization and increase in the productivity of the resources they harvest from the mangroves as a result of their conservation efforts. Although all community members harvest resources to some degree, the increase in productivity has principally benefited the poorer members of the community who are more reliant on the mangroves for their livelihoods. The crab collectors of the community were the stakeholder group who benefited the most, as the majority of them own little or no land and often rely solely upon the commercial harvest of crabs for their livelihood.

The creation of the Village Savings Group, an important early stage of the conservation effort in Pred Nai, has also provided many benefits to the community. The savings group, through its loans to community members in need, has served as a vehicle to aid in social and economic development, for example assisting people to pay for education or health care costs. It has also provided a small, but relatively secure savings mechanism for all members of the village where the profits actually benefit the community.

The learning-tourism program that the conservation group runs has also helped the community to fund their conservation group. A portion of the profit made from feeding and hosting guests to the community is paid back to the conservation group and these funds are used to fund the community's patrols of the mangroves and other conservation efforts. Although most of the villagers felt that the learning-tourism program contributed little to the economy of the village, it is likely that outsiders visiting the community also provide additional income for the restaurants and stores in the community.

ii. What indirect benefits were observed (e.g., awards and recognition; publicity; increased funding opportunities for conservation)

The community of Ban Pred Nai has received widespread recognition for their successful conservation efforts. Two of the awards received include the Green Globe Award in 2002, and the 2004 Equator Initiative nomination. The villagers of Pred Nai are very proud of their successful conservation efforts and are eager to share their experiences with others. An additional benefit from the relative

fame that Pred Nai received is that the village has been approached by numerous government agencies and NGOs who wish to become involved with their conservation efforts. For example, during the conduct of this research the village leadership was approached by representatives from the national DMCR office who wanted to include Pred Nai in a pilot project testing the effectiveness of an artificial concrete coral reef in providing fish habitat and protecting against shoreline erosion.

Pred Nai was also fortunate enough to participate as one of the hosts in an Asia Pacific Economic Cooperation (APEC) youth camp in July of 2003. The camp brought together dozens of students from many different APEC countries to host sites across Thailand in order to learn about mangrove forests and sustainability issues. Pred Nai, because of its successful conservation efforts, was chosen as one of the sites to be visited by the dozens of students attending the APEC youth camp. Special events, such as the aforementioned youth camp, and recognition, through special awards, help to promote pride in the community and a sense of accomplishment.

r. Livelihood strategies, coping and adapting

i. How did involvement in the project affect other livelihood pursuits, negatively or positively?

Pred Nai's conservation efforts have had a positive impact on the livelihoods of the villagers. Their conservation efforts have stabilized and restored the local ecosystem and improved the harvest of resources from the mangroves. This has helped not only those villagers who harvest mangrove resources as the main source of their livelihood but also the entire village as the majority of people supplement their livelihoods with fish, shrimp, crabs, and other resources from the mangroves.

Although the community members at large have benefited from the work of Pred Nai Community Forestry Group there is a small minority of community leaders who have seen their livelihoods adversely affected. This small group of leaders is actively involved in the activities of the conservation group and networking with other communities, often to the point where the time commitments they have made limit their ability to spend time on livelihood activities. For example, one prominent leader within the community shared with the researcher that in the month of June he was either involved in meetings or traveling between them for 24 days of that month.

ii. How did the project affect the ability of households and the community to adapt to changes?

The effect of the project upon the community's ability to adapt to changes in the market has been positive. The conservation of the mangrove forest and the numerous marine, aquatic and terrestrial flora and fauna that comprise the ecosystem has preserved the economically important harvesting options that are currently exploited. More importantly, the conservation of the mangroves also

preserves other species and harvest options which can be exploited in the future as market demands dictate. An example of the community's adaptability to market changes was evident this year when the region underwent a drought making their fruit gardens less productive. The fruit growers adapted by spending more time in the mangroves harvesting Grapsid crabs and other resources in order to meet their livelihood requirements.

s. Resilience of communities, livelihoods and management systems

i. Did the project add options (e.g., livelihoods, alternative management possibilities, new coping and adapting strategies)?

The conservation/management project in Pred Nai, by preserving the resilience and ecological integrity of the local mangrove forest, has maintained the options for exploitation and conservation that currently exist and has also preserved the potential for new options in the future. The resilience of the mangrove ecosystem in its relatively undisturbed state will allow the conservation group to experiment with different management regimes and techniques. In terms of livelihoods, there is a large number of flora and fauna that remain and may be harvested or utilized by villagers at a later date.

ii. Did the project create learning opportunities?

The conservation effort in Pred Nai has created numerous opportunities for learning, both at the academic and community level. Joint research conducted between the community and various universities can produce results which are practical and useful to the community's management but also of interest to the wider academic community. Pred Nai's "eco-tourism" program in which they play host to other community's leaders as well as government and NGO representatives teaches both policy makers, field practitioners/funding agencies, and community members about their experiences with community-based management. Another important learning opportunity that was created by this project is through the community forestry networks operating at the district, provincial and regional scale. These networks act as an important mechanism for communities to share information concerning management practices and as a convenient venue for academics and NGO representative to disseminate relevant and practical scientific information to a large number of communities.

iii. Did the project create self-organization opportunities?

The project not only created opportunities for self-organization but the creation and development, over time, of the conservation group was itself an exercise in self-organization. Community members participating in the conservation group have actively shaped the organization and composition of the conservation group, from its roots as an informal group of villagers patrolling the mangroves to its current formal status. The community has shown particular strength in its abilities to self-organize by initiating local conservation by its own initiative and creating

the conservation group without relying on outside funding in order to drive the process.

- t. *Transferability of the lessons from this Equator Initiative case*
 - i. *Which lessons were likely transferable? Why?*

1. Availability of funding to proceed in small, practical steps

It is a common conception in the mind of westerners that funding must be available in order to proceed with any type of natural resource management. The experiences from Pred Nai suggest that, although funding was necessary, it may not always be necessary in the amounts and in the forms that people from developing countries typically perceive. Although Pred Nai's conservation and management efforts did receive some large inputs of funding in order to construct the walkway through the mangroves and purchase patrol boats, it seems that these elements were supplemental to the project. The success of the project instead relied upon the determination of the local population and some funding which was available in order to meet expenses and enable the community to proceed unhindered by the limitations of their own personal finances. For example, in Pred Nai's case as RECOFTC helped the community to set up the provincial community forestry network, the NGO often provided money to the leadership of Pred Nai and other communities in order to cover all or part of their fuel expenses to travel between communities and attend meetings. This assistance, although relatively small to the funding agency can make a huge difference to the participants; allowing them to participate in the networking process while minimizing their own personal expenses. By providing funds for smaller steps which met immediate needs the funding agencies also minimized the risk for waste or corruption.

Another point of note in regard to funding is that prior to the availability of funds, the community was already involved in conservation and management activities and had already begun establishing an organizational structure. When allocating funding for community-based projects it may be best to provide funds to communities which have already shown initiative in engaging in conservation or management. This allows funding agencies to capitalize on existing capacities within the community and to increase the chances of success. Alternatively, communities with less social capital in place may benefit more from funding of capacity building activities or assistance in the form of technical or managerial expertise, whereas placing funds directly under their control increases the chances of misuse of the funds.

2. A Village Savings Group provides capital, training, and lends credibility to the community

Pred Nai's case also illustrates the important role that a village savings group or micro credit program can play in achieving successful community-based management. There are four fronts in which a village savings group can assist a community; first, by providing capacity building and increasing the social capital in the village; second, increasing the available capital and improving the financial

positions of individual households; third, by creating a formal organizational structure in the community and lending credibility to the group's ability to handle finances without misuse or corruption; and fourth, by helping to build unity and a greater sense of belonging within the community.

The village savings group has provided a form of self-administered capacity building in the village. Although a local Buddhist monk was key in initiating the program and providing the initial training the villagers participation in administering and organizing the savings group provides invaluable experience which is also applicable to conservation and resource management. Participation in the savings group helps build skills in money management (individually & collectively), managing people, and creating and operating a formal organization (including running meetings).

The savings group also provides financial capital for the villagers who participate in the program in two ways. First, the savings group acts as a mechanism for villagers to save some income in a regular and relatively safe manner, by requiring villagers to commit to buying a given amount of "stocks" in the savings group every month. Once the villagers have saved up 40,000 baht (approximately \$1,000 USD) worth of stocks they are permitted to withdraw up to half of the money to spend on whatever they wish. The second and more important financial benefit from the savings group is its loan program. Villagers who are members of the savings group can apply for a low-interest loan from the savings group. The village committee which administers the program decides on loan approvals with priority given to loans which will be used for education or healthcare.

In Pred Nai, the community had organized themselves informally in order to defend and conserve their local resources but the village savings group was an important formal organization implemented largely by the villagers with some outside help. The creation of the savings group likely impacted on the villagers' decision to formalize their conservation group. The pre-existing savings group not only helped the villagers in the creation, organization, and administration of the conservation group but also helped to create more confidence in the conservation group by outsiders. The savings group has demonstrated that the community is not only organized, but is also able to manage and account for significant sums of money, thereby increasing the chances of obtaining outside funding for the conservation group.

3. A number of steps leading to formal management

An important lesson learned from Pred Nai is that community involvement in informal conservation or development activities prior to engaging in active management can form a foundation for the success of formal management. In Pred Nai's case, the creation of the formal conservation group and the concurrent active management of their forest grew as a natural progression from the community's informal conservation and environmental protection efforts. Pred Nai's active involvement in conserving and protecting their mangrove forest

helped to establish a strong conservation ethic among community members, increased the unity and cohesiveness within the community and also facilitated a natural development of leaders within the community. The development of the village savings group acted to further increase the community's unity and also acted to build the social, financial, and technical capacity amongst individuals in the village. In addition, the savings group also helped to improve money management skills for community members and demonstrated organizational responsibility, which gave the community more credibility when seeking outside funding for their formal management group.

By engaging in conservation and development activities, prior to assuming the responsibility for management of their resources, communities gain valuable skills and important experience which helps them to succeed in future formal management. Communities which become involved in management of their local resources without any prior management or organizational experience would likely face a higher rate of failure due to a lack of experience. In cases of grassroots initiative for conservation and management these steps of increasing involvement may be even more important as they allow the community in question to not only build capacity within the village but also establish linkages, with NGOs, government agencies and other communities, which may be critical to their success in management.

4. Step-wise evolution allows for capacity building over time

Capacity building is widely recognized as an important part of community-based management. Pred Nai's success demonstrates that many skills and abilities relating to community-based management can be obtained prior to engaging in formal management, and in some cases, of the community's own initiative. The case of Pred Nai Community Forestry Group provides an excellent example of capacity building over time, accumulated from both within and outside of the community, as the community progressed towards management of their local resources.

In cases of grassroots community-based resource management the steps which occur prior to engaging in management activities are important in equipping the community with the knowledge, skills, and connections necessary to succeed in natural resource management and conservation. Pred Nai's case shows a considerable amount of capacity building which was provided in the form of training, carried out mostly by NGOs and government agencies. This formal training took place in conjunction with the activities of the village and conservation group which also helped to build capacity within the village. Pred Nai's case demonstrates that communities can, through their own means and organization, undertake internal or self-initiated capacity building which, although often limited in depth and breadth, will assist in conservation and management efforts. For example, in Pred Nai's case internal capacity building was both formal and informal and ranged from activities as diverse as forming and operating the informal patrol group; initiating a summer camp to teach village

children about local history, the conservation group, and the mangrove forest; and early efforts at reforestation done without outside support.

In many cases within Pred Nai it is difficult to differentiate between internal and external capacity building. For example, the idea for the savings group and the initial training was provided by a local monk, however, once established it was relatively self-contained and the villagers who administered the group gained many valuable skills. This also shows that successful capacity building by outside agencies does not necessarily have to be in the form of classes or formal training but may be delivered simply by facilitating or providing opportunity for the village to undertake activities which will provide members with valuable experiences and learning opportunities.

5. Interplay of leadership, community cohesion and NGO support

Pred Nai's success in conservation and natural resource management is due to a complex interplay of community involvement, support from outside institutions and communities, and strong, honest, leadership. When villagers were asked why Pred Nai had been so successful in their conservation and management efforts these three factors were the most common responses given. Community involvement and support for the project is critical, as participation provides the foundation for community-based management. Linkages with NGOs, government agencies and other communities are critical for capacity building, as well as legal, institutional and technical support. Strong, honest, accountable leadership is needed to provide direction to, and focus for, the community-based initiative as well as to ensure that the community remains in control and the project is not hijacked by outside organizations. In the case of Pred Nai, it appears that these three pillars were key to the success of the project.

6. Leadership key to grassroots movement

Leadership, as mentioned in the previous section, is one of three key elements, including community unity/support and NGO support, to the success of community-based management. The role of leadership, as exemplified by the case of Pred Nai, appears to be even more important as strong leaders may be able to develop unity within the community and cultivate the requisite support from NGOs and government agencies.

Strong leadership is important within most organizations in order to provide direction and guidance. Within community-based management initiatives leadership is important for these same reasons but also for many more unique to community-based projects. For example, charismatic leaders can act: to increase community participation; they can act as a strong unifying force within the community; leaders serve as focal points for networking with government, NGOs, and other communities. In addition, in many cases leaders are from more privileged socioeconomic classes and thus have more education and training, and more personal resources, including time and money, available to them.

Within Pred Nai strong leadership appears to be a key to the success of the project. For example, during interviews when people were asked why Pred Nai had been so successful in their conservation and management endeavors the most common answer given was due to the strong leadership in the community, with many interviewees pointing to one or another leader. Currently, there are two important leaders within the community, the head of the conservation group and the village headwoman. Both are actively involved in different facets of the management effort, including working with stakeholders within the village and networking with communities and organizations outside the village.

7. Partnership with a key organization for building capacity and establishing linkages

Cross-scale institutional linkages are recognized as being critical to the success of community-based management projects. Within projects that have grassroots origins, however, these linkages are not likely to be present at the project's outset. NGOs can play an important role in facilitating the initiation and development of these cross-scale linkages. In Pred Nai's case the NGO RECOFTC, was a critical enabling organization in developing the conservation group and management plan and in creating and developing both horizontal and vertical institutional linkages. RECOFTC became involved with Pred Nai soon after the establishment of the formal conservation group and in 2000 they began a participatory action research project with the community which served as an important catalyst for the conservation group. RECOFTC's involvement was multi-faceted and resulted in co-operative surveys of the mangrove forest, refinement of the management plan, capacity building and technical support. Horizontal linkages were encouraged through the creation of community forestry networks at the district, provincial and regional scale. Vertical institutional linkages were facilitated with government agencies and universities through RECOFTC and resulted in collaborative research projects between the community and universities; study tours of the community by government officials, academics, and other community leaders; as well as greater collaboration between Pred Nai and local government departments. The case of Pred Nai shows that NGOs can act as important catalysts in the development of community-based projects that are grassroots in nature.

It is also important to note that although RECOFTC was a critical organization and offered important support to Pred Nai, it was the initiative of the community which began the conservation and management efforts. The community had already begun their conservation group, developed a rough management plan and was engaged in managing their mangrove forest when RECOFTC became involved. Thus RECOFTC acted as an important catalyst in helping the project to become successful and especially in developing linkages but the community had acted on their own initiative and had already achieved a number of successes. NGOs appear to be critical in supporting community-based projects; however, it may be best if they become involved after the community has initiated the process on their own. This allows the community to build on experience, establish what

their needs are for support and assistance, and to build community support and ownership of the project.

8. Horizontal learning among communities is the key to replication

Community-based management projects have been split between successful and unsuccessful cases. An important consideration for development and funding agencies is how to replicate, or facilitate the replication, of these successful projects within other communities. Pred Nai's case illustrates that horizontal sharing and learning, through networks and direct intercommunity connections, is an effective means of both replicating and initiating new community-based projects. In addition, horizontal learning and sharing between communities increases the probability of success for a given community-based project as it allows for the community, which is starting out, to draw from the knowledge and experiences, both successes and failures, of more experienced communities.

Horizontal learning among communities, supplemented by technical support from NGOs or government, may be the key to replicating successful initiatives and helping new projects to reach their goals. Instead of being told about an abstract concept from a NGO or development agency, communities seem to be more willing to try their own conservation or development projects when they can see the experiences and results from another community. The initiation of networking between communities allows communities which have not started their own conservation projects to learn about the process of organizing and administering projects, where to obtain outside support and funding, and how to overcome common obstacles.

9. Local ecological knowledge as the foundation for environmental stewardship

There is a growing recognition within academic literature of the important role that local ecological knowledge can play within natural resource management and conservation. Within the context of community-based or co-management arrangements, where the community is the operative level, local ecological knowledge can be especially important. In many cases, local ecological knowledge forms the foundation for the community's relations to the environment.

The case of Pred Nai is a prime example where a community's local ecological knowledge forms the foundation for environmental stewardship by contributing to their conservation and management efforts. For example, the crab collector's precise knowledge of the spawning cycles of Grapsid crabs enabled the conservation group to construct the rules prohibiting collecting crabs during the crab's spawning period. Pred Nai's case also illustrates that although local ecological knowledge can be an important ingredient for successful community-based management it is rarely sufficient on its own. Within Pred Nai, local ecological knowledge was useful for management but could offer the community little assistance in their mangrove restoration efforts. In this case the community's

partnerships with government agencies, which had knowledge on mangrove restoration, proved useful as the government agencies were able to provide needed, practical knowledge. This knowledge of mangrove restoration can then be maintained within the community through the same mechanisms used to transmit local ecological knowledge.

The potential also exists for the integration of local forms of environmental knowledge and conventional scientific knowledge. Local and traditional ecological knowledge can serve to act as hypotheses for collaborative research projects with universities or government agencies. More importantly for community-based management and local capacity building, there is often an opportunity for the community itself to become involved in the design, conduct, and analysis of research projects. For example, Pred Nai is currently engaged in collaborative research projects with: RECOFTC, testing the effect of thinning the mangroves on the populations of Grapsid mangrove crabs; and the TRF testing the effectiveness of bamboo fences and artificial rubber “fish houses” on reducing shoreline erosion. In situations where the community becomes involved in the conduct of the actual research they stand to benefit not only from the results of the research, but also from their participation in the research process itself.

ii. Which lessons were not transferable? Why?

There are two elements which contributed to the success of Pred Nai which are not necessarily transferable to projects in other areas of the world. The first is that within the project there was minimal internal conflict within the village. When conflict was present it was largely suppressed and kept from escalating. For example, there was an existing conflict and power struggle ongoing between two of the key leaders of the project. Despite this the two were openly willing to work together in the interests of the project and it took the researcher over a month in the field to discover the existence of the conflict at all. Although in some circumstances it is best to resolve conflicts as they appear, the relative lack of and low-intensity nature of internal conflict within Pred Nai seems to have led to an ease of internal management and helped contribute to the community’s success. The lack of conflict in the community is due to two factors. First, avoidance of conflict has been noted as being characteristic of Thai society (Boyle, 1993) and second, the tight-knit, almost family like, character of the village has also contributed to the civility and lack of conflict in the community. Within different cultural settings where conflict is not socially taboo, community-based management is likely to be impeded and made more difficult through internal conflicts between stakeholders and different user groups within a community.

The second element which contributed to the success of the conservation group in Pred Nai is the patriarchal nature of Thai society (Boyle, 1993). As discussed earlier, leadership is a key element of community-based projects. Within a patriarchal society the task of leadership becomes somewhat easier as there is a cultural tendency to follow those perceived as leaders. This characteristic,

although not unique to Thai culture, is not common to all cultures throughout the world; thus, in some circumstances, leadership within a community may face a more difficult task in rallying community support and administering the community's conservation or management effort. The patriarchal nature of society also contributes to low levels of conflict in the project as villagers are often more willing to follow their leadership even in cases where they may not agree with their actions or decisions.

u. Recommendations to improve the Pred Nai case

Pred Nai Community Forestry Group has achieved great success in achieving both environmental conservation and economic development. Despite the success of the conservation group, however, the project does suffer from shortcomings in a number of areas. First, Pred Nai has developed from a largely independent, grassroots project to a community which stands in the centre of a large number of linkages with other organizations which have become involved in the project or with the community. Pred Nai Community Forestry Group would be well served by implementing an effective method of dealing with the many outside organizations which are involved, or want to become involved, with Pred Nai. It may even be necessary to limit the number of outside organizations to a manageable level. The project also needs to develop a better system of disseminating information about these outside organizations to community members. One of the complaints voiced by villagers was that there were simply too many organizations involved with Pred Nai and the average community member had no idea who these organizations were or how they were involved in the community.

A second and related problem identified by the leadership of the community was that they were simply becoming overwhelmed dealing with the many meetings and conferences required to administer the conservation group and maintain the linkages with the networks and outside organizations involved. The large amounts of time required of the village leadership has begun to detract significantly from their time spend on livelihood activities and with their families. For example, one senior leader in the conservation group shared that he had meetings or conferences, many in distant parts of Thailand, scheduled for 24 days in the month of June alone. If Pred Nai is able to better manage or streamline its linkages with other organizations this would assist in reducing the workload of project leadership. It may also be important to begin including more people in leadership positions, possibly based upon a mentoring relationship with current leaders. A mentoring system for leadership would involve more people in the administration of the project and also act to help to train future project leadership. If a system cannot be found to reduce the time required of Pred Nai's leadership then it may be necessary for the village to seek some outside funding and compensate the leaders for the time that they devote to the project.

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