

**Lessons from the Equator Initiative:  
Community-based Arapaima  
conservation in the North Rupununi,  
Guyana**

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June 2004**

**Joint Project with the  
International Development Research Centre (IDRC)  
and the  
United Nations Development Programme (UNDP)  
Equator Initiative  
([www.equatorinitiative.org](http://www.equatorinitiative.org))**

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## Summary

This technical report examines the lessons learnt from a community-based effort to manage the Arapaima (*Arapaima gigas*), an endangered fish of the North Rupununi region in Central Guyana. The Arapaima management effort is a subproject of the North Rupununi District Development Board (NRDDB), which was short-listed by the UNDP Equator Initiative as a successful example of integrated conservation and poverty reduction. The results presented here are based on a series of interviews and focus group sessions conducted between July and November, 2003.

The report begins by introducing the research objectives, methodology and the theoretical background. This is followed by a short description of the study site, local culture and communities, and the Arapaima management project. The third component of the report then presents the study's major findings and discussion.

The report's findings and discussion are divided into five sections. The first examines community organisation and associated factors leading to the initiative's creation. Specific focus is given to knowledge sources, learning, and the key persons and supportive organisations involved. The discussion then turns to cross-scale institutional linkages and identifies the organisational levels of major stakeholders, the types of institutional linkages involved, and their effect on the project. The report continues with a description of biodiversity conservation and environmental improvements related to the initiative. This is followed by an examination of project related changes in income or livelihood opportunities within the communities. The discussion then concludes with a general examination of the initiative, culminating with a list of lessons learned.

The list of lessons learned at the end of the report attempts to address the study's primary purpose. This list first provides transferable lessons, including tailored capacity building, the creation of collaborative institutions and mechanisms, appropriate distribution of jurisdiction and rights to the resource, horizontal learning, the use of Traditional Ecological Knowledge as an entry point, and the provision of livelihood alternatives. The list then closes with an examination of non-transferable lessons, including supportive cultural and social conditions, committed local leaders and NGO personnel, and consistent support from partner organisations.

## List of frequently used acronyms and abbreviations

AMP	Arapaima Management Plan
CEW	Community Environmental Worker
CFC	Community Fishery Committee
CIDA	Canadian International Development Agency
DFID	Department for International Development
EFC	Executive Fishery Committee
EI	Equator Initiative
FAO	Food And Agriculture Organization
IUCN	The World Conservation Union
Iwokrama	Iwokrama International Centre For Rainforest Conservation and Development
Mamirauá	Mamirauá Sustainable Development Reserve
NRDDB	North Rupununi District Development Board
UNDP	United Nations Development Programme

# 1. Introduction

## 1.1 *Brief description of research*

Community-based management has emerged as the dominant approach to integrated conservation and development. This approach often strives to reduce poverty through the conservation and sustainable use of biodiversity. Community-based management has had mixed results, and has failed to live up to expectations in many cases. Some argue that this failure is due to the impracticality of integrating the goals of conservation and development (Redford and Sanderson 2002).

How can community-based conservation reduce poverty through the sustainable use of biodiversity? We propose to address this question by identifying and understanding the conditions under which community-based conservation is successful. For this research we focused on a number of conservation and development projects short listed by the UNDP's Equator Initiative (EI). Two cases were subsequently chosen for research and comparison, including the North Rupununi District development Board (NRDDB) in Guyana, and the Toledo Institute for Development and Environment (TIDE), in Belize. While facing similar challenges, these initiatives seem to have developed unique and innovative approaches to conservation and poverty reduction.

This research is one of several EI case studies in a coordinated team project at the Natural Resources Institute, University of Manitoba, through a partnership with the International Development and Research Centre (IDRC) and the Biodiversity Conservation Office of Environment Canada. By documenting how biodiversity conservation and economic development can be simultaneously achieved, the research findings will be used to further the theory and practice of community-based conservation.

## 1.2 *Purpose*

The purpose of this study is to research the lessons learned from the NRDDB and TIDE initiatives in how biodiversity conservation and economic development can be simultaneously achieved. This technical report details the research findings related to the NRDDB. Rather than examining all of the projects under the NRDDB umbrella, this study focused specifically on the NRDDB's Arapaima management project. The research findings presented here therefore relate primarily to this project. However, the report does include a brief analysis of the larger NRDDB initiative (Appendix 1), with some discussion of its origins and key institutional relationships (Figure 3).

## 1.3 *Research Objectives*

The objectives of this study are:

1. To document the role of self-organization in the development of the initiatives.
2. To identify the cross-scale institutional linkages that facilitated project development and functioning.

#### *1.4 Methods*

Fieldwork was conducted from July to November 2003. Research methods involved a combination of Rapid Rural Appraisal techniques, including an archival review, informal and semi-structured interviews, participant observation, and a focus group session. These techniques were used to examine traditional and contemporary Arapaima management, local Arapaima folklore, significant changes in Arapaima use and fishers' livelihoods, community organisation and cross-scale institutional linkages affecting the project.

A total of thirty-two (32) semi-structured interviews were carried out with community members from ten (10) communities. Additional interviews were conducted with four (4) Government officials and two (2) NGOs personnel involved in the conservation project. The focus group session was used to conduct a timeline analysis and an institutional mapping exercise. The session was attended by twenty-one (21) participants from eleven (11) communities, including fishers, leaders and community project personnel. Participant observation was also used to gather data during community meetings, daily activities, and project monitoring. Archival research was also conducted to examine changes in fisheries legislation, historical Arapaima use, and changes in traditional resource use practices.

#### *1.5 Theoretical Background*

Self-organisation, learning and adaptation are central to the concept of resilience, and hence efforts to achieve sustainability. Holling et al. (1998) suggest that self-organisation is a primary evolutionary characteristic of both the social and environmental components of resource management problems. They go on to argue that the diversity, widespread occurrence and long track records of local management institutions suggest that many traditional social systems evolve and respond to ecological change. This leads to feedback learning and the generation of locally devised and adaptive management practices (Folke et al. 2002; Holling et al. 1998). Self-organisation in these traditional social systems thus allows them to cope with environmental changes before they accumulate and pose a threat to the community's social well being. This adaptive characteristic demonstrates that social and ecological systems "...can change qualitatively to generate and implement innovations that are truly creative..." (Holling et al. 1998:361). Self-organisation can therefore provide social systems with opportunities for innovative co-operation, built on feedback, learning and adaptation.

Complex social and ecological systems cannot be understood by examining any one scale in isolation. Effective management must take place at multiple scales, and involve institutions linked across space (horizontally) and across different levels of organisations (vertically) (Barrett et al. 2001; Berkes 2002). Horizontal linkages may include community networks involved in resource management initiatives, and the learning that results from this interchange. Vertical linkages refer to the relationships between different organizations at multiple levels, as in co-management. These horizontal and vertical institutional interactions are known as cross-scale linkages (Berkes 2002).

This multiplicity of scales is often ignored by state level, "one size fits all" conservation (Barrett et al. 2001). Such a centralised approach is incapable of incorporating feedback from management outcomes and ecosystem change into future management. This

mismatch of scales results in the loss of ecosystem resilience and the movement of natural system towards thresholds of collapses (Berkes 1996). Centralised management is thus often identified as a primary obstacle in attempts to achieve sustainable resource management and conservation (Holling et al. 1998).

Cross-scale conservation must therefore start at the lowest level of the organizational hierarchy, with planning being “bottom-up” (Berkes in prep.). Effective conservation in countries with legacies of centralised resource management will require the strengthening of local-level institutions in order to facilitate increased cross-scale interaction (Berkes 2002). Since governments often retain the majority of power in developing countries, state support and interventions are vital in achieving effective community-based management. These interventions may include state recognition of local institutions; development of enabling legislation; cultural revitalisation; capacity building; and local institution building (Berkes 2002; Ostrom 1990). However, empowerment of local communities is often difficult, since there is little incentive for governments to relinquish their power (Lele 2000). That said, some Governments also recognise that power-sharing with communities can also lead to cost savings, better enforcement and more effective compliance (Berkes, in prep.). The challenge for many communities is therefore finding ways to increase government support for the strengthening of local-level institutions, and the transfer of rights to local community resource.

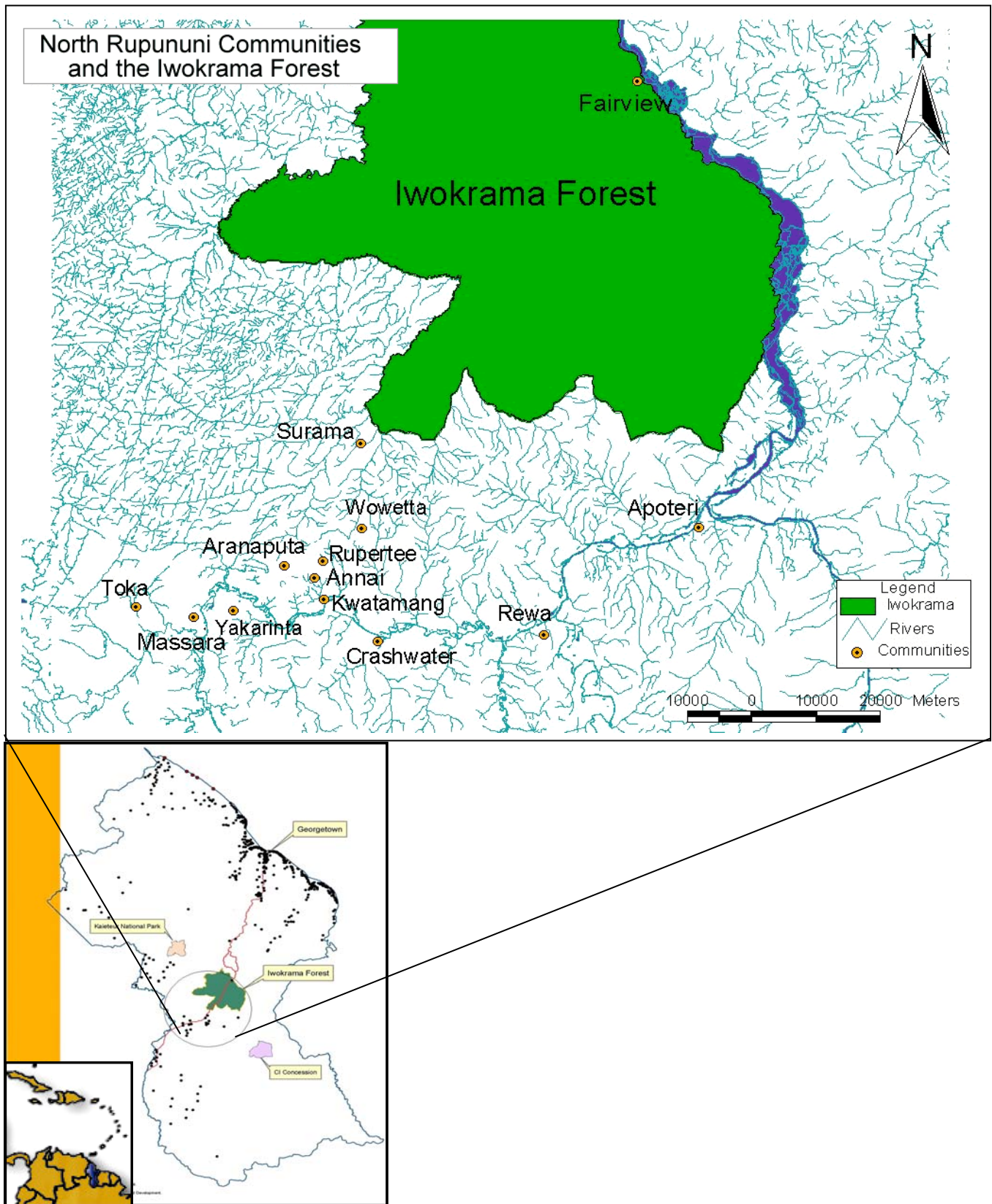
## **2. Situational Background**

### *2.1 The North Rupununi Savannas and its people*

The Rupununi Savannas are on the eastern margin of a larger savannah system that extends into Brazil. The Guyana savannas are divided into the North and South Rupununi Savannas by the Kanuku Mountains.

The North Rupununi Savannas, which are approximately 8,000 km<sup>2</sup>, form a seasonally flooded plain, known as the North Rupununi Wetlands (Figure 1). These Wetlands are dominated by the Rupununi, Rewa, and Essequibo Rivers, and include over 750 lakes, ponds and inlets covering approximately 220 km<sup>2</sup>. During the rainy season, the Rupununi River floods into the surrounding savannas and forested areas. This flooding creates a large, unique wetland, which is an important feeding and spawning area for the area’s fish species. These flooded savannas also represent a historic pathway between the Amazon and Guyana’s river systems. As a result, the area contains remnant populations of Amazonian endangered species, which migrated into the area via the link between the systems. The area is thus globally unique, with extremely high fish species richness for an area of its size.

The North savannas are also the traditional home of the Makushi Amerindians. Compared to other indigenous Amazonian societies, traditional Makushi social organisation is known for individualistic tendencies, loose social structures, and lack of formal social groupings (Rivière 1984). Prior to missionary contact in the 1800s, the Makushi were primarily semi-nomadic, with both individuals and households being relatively mobile. Settlements were characterised primarily by a loose grouping of houses, although some nucleated settlements did exist (Rivière 1984, Myers 1993). These ‘villages’ tended to be political decentralized.



**Figure 1 – Map of study area**



However, local leaders or *Toushaus* were, and still are, a common feature of many settlements. Traditional Makushi culture included seasonal rituals and festivals, *parishara* dances and songs, and a rich folklore involving complex human-animal myths and food taboos. Although many of their beliefs and practices have faded, a significant amount of Makushi culture is retained today in remnants of the local folklore.

The primary livelihood activities in the area are subsistence farming and fishing. The main local crop is *cassava* (*Manihot esculenta*), which is used to produce farine (roasted cassava grains), cassava bread, tapioca, and various beverages. Fish are the major source of protein in the region. As such, fishing is an extremely important subsistence activity. There is some local commercial exploitation of wildlife, for the bush meat and pet trades. In these areas, Arapaima (*Arapaima gigas*) was harvested for both subsistence and income generation. Arapaima, or *warapai* in Makushi, is also a large part of local folklore, with a number of myths and taboos related to the species.

## 2.2 Community Structures

The Makushi of the North Rupununi are distributed among fourteen primary communities, consisting of approximately 3500 people. Annai Central, Crash Water, Rewa, Toka, Massara, Wowetta, Rupertee, Kwatamang, Kwaimata and Yakarinta villages are homogeneous Makushi communities. Apoteri village is a mixed Wapishana-Makushi community; Aranaputa village is mixed coastlander-Makushi community; Surama village is a mixed Arawak-Makushi community and Fairview village is a mixed Arawak-Wapishana community.

Eight of the fourteen communities (the exceptions being Rewa, Apoteri, Fairview, Kwaimata, Crash Water and Aranaputa) have legal title to some of their traditional lands. However, many of these communities have historically enjoyed customary rights to surrounding land and resources, to which they have no title. The villages are presently represented by democratically elected *Toushaus* or Captains.

These leaders make up the North Rupununi District Development Board (NRDDB), a local community-based NGO that facilitates the management and development of their member communities. The NRDDB was initially established as a formal link between the communities, government agencies, and Iwokrama, but has since taken responsibility for the planning and coordination of most educational, developmental, cultural and research programmes in the North Rupununi. The NRDDB currently oversees a number of ongoing projects. This research specifically examined the origins and development of the Arapaima conservation project and its linked initiatives.

## 2.3 The Initiative: Arapaima conservation

The Arapaima is one of the largest freshwater fishes in the world, reaching up to 3 m in length and 275 kg in weight. It is an obligatory air breather and has to surface regularly in order to obtain supplemental oxygen. As a result it is an easy target for fishers. When hunted, nearly all of the individuals in a lake can be removed. As a result, this species is threatened in many areas of its range, including Guyana.

Overharvesting in the last 30 years led to the rapid decline of Arapaima populations in Guyana's North Rupununi Savannahs. In the late 1990s, joint action was taken by the NRDDDB and Iwokrama to develop a conservation project focused on the recovery of the species. The centrepiece of this initiative is the Arapaima Management Plan (AMP) (Box 1), which was crafted through discussions with communities, Iwokrama, and the Mamirauá Sustainable Development Reserve in Brazil. Current efforts involve the NRDDDB endorsing the harvesting ban; the formation of fisher groups at village and regional levels; a local monitoring program with check points; and a community education and awareness campaign (See Appendix 3 for a brief evaluation of these subprojects).

### **3. Major Findings and Discussion**

#### **3.1 Community organization**

##### *3.1.a. Origins of the project*

- i. *Date of community initiation:* There was no specific date of project initiation. Arapaima management was first officially identified as a major community concern during resource management workshops sponsored by Iwokrama in 1998. Additional milestones include the community endorsement of a harvesting ban in 2000 and the establishment of a NRDDDB Fisheries Task Force in 2001 (see Appendix 2 for Timeline).
- ii. *Date of formally established:* The NRDDDB was established in January 1996.
- iii. *What inspired or precipitated the project?*  
Arapaima harvest was taboo in traditional Makushi culture. However, the taboo broke down due to outsider harvesting, and by the 1970s and 80s communities in the area had begun to notice a dramatic reduction in the number of Arapaima. Although some people attributed the reduction to the disappearance of traditional rituals, most villagers seem to recognize overharvest as the major cause of the Arapaima's disappearance. Community members raised concerns over the state of the Arapaima fishery at village meetings and during regional meetings with Government officials in the 80s and 90s.

In 1998, workshops were held between the newly created Iwokrama International Centre and the North Rupununi communities. It was at these meetings that Arapaima management was identified as a local priority. This was to mark the beginning of a process that led to the establishment of links with the Mamirauá Sustainable Development Reserve in Brazil, which was involved in an existing community-based Arapaima management project. The Brazilian project was subsequently used as a model in the development of the North Rupununi's Arapaima Management Plan (Box 1).

**Box 1. The Arapaima Management Plan**

The Arapaima management plan refers to an effort by North Rupununi fishers to experimentally manage Arapaima (*Arapaima gigas*) for a period of three years. The management plan was developed jointly by the communities, Iwokrama and the Mamirauá Sustainable Development Reserve in Brazil. The guiding philosophy of the plan is that local social organization will be improved as local people work to conserve an economically important natural resource. The Plan's objectives are to increase the local Arapaima population, improve local organization institutions and increase local fishers' income. Structures created to implement the Plan include a community-imposed harvesting ban; the formation of fisher groups at village and regional levels; a local monitoring program with check points; and a community education and awareness campaign.

*iv. Whose idea was it?*

The “idea” for the project came from a series of meetings between community members, and Iwokrama scientists.

*Trigger event.*

Iwokrama sponsored community workshops, particularly the workshop held in 2000 with Government officials, Brazilian and UK fish specialists, and Iwokrama scientists.

*Catalytic element.*

Iwokrama's link with Mamirauá and the subsequent training of Guyanese fishers in the Arapaima survey method.

*Other.*

The project personnel that seem most committed to the project (Fisheries Committee Chairman, Secretary, and Survey coordinator) have all visited Mamirauá and seen the Brazilian project first hand.

*3.1.b. Knowledge**i. Sources of knowledge:*

This project is modelled on another initiative, and thus involved significant information sharing and knowledge transfer during its development.

- There was a major exchange of knowledge and expertise between the Brazilian and Guyanese projects. In 2001, Mamirauá fishers training their North Rupununi counterparts in a survey method for monitoring Arapaima populations (Box 2). This survey method is based on the ability of experienced fishers to distinguish between individual Arapaima at the moment of breathing. Once the method was proven to be scientifically rigorous, a workshop was

conducted to train Brazilian, Peruvian, and three Guyanese from the North Rupununi in the survey method. A follow-up training workshop was then held in

**Box 2. The Arapaima Survey Method**

Arapaima must gulp air in order to survive. Castello (2004) demonstrated that experienced artisanal fishers have the ability to count the number of Arapaima in a defined area by distinguishing individual fish at the moment of breathing. He showed that counts were strongly correlated ( $r = 0.98$ ) with mark-recapture estimates calculated for the same populations. The study also assessed and confirmed that experienced fishers have the ability to train other fishers to count Arapaima.

Guyana, and included fishers representing all of the then 13 member communities of the NRDDDB. The workshop was conducted by four Brazilian Arapaima fishers, who instructed and then tested the Guyanese fishers. The accuracy of counts made by the trained Guyanese fishers was found to be similar to their Brazilian instructors.

- Institutional structures, such as the Executive Fisheries Committee (EFC) and the Community Fisheries Committees (CFCs) (Box 3), are based on the Brazilian model. These structures were set up based on technical advice provided by a Mamirauá scientist, with the NRDDDB, village councils and local fishers contributing in the form of human resources, organisational support and technical expertise. These institutions were developed in Brazil based on a one community project. Local input was therefore critical in modifying these structures to better cope with the multi-community conditions in the Rupununi. Many of the CFCs no longer function (Figure 6). This may be related to the absence of harvest, since the management of harvesting is the primary function of the CFCs.

- Although harvest has yet to occur, the AMP specifies that quotas will be determined collaboratively, and incorporate scientific advice from Iwokrama personnel.

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

Many fishers have knowledge pertaining to the biology and ecology of the Arapaima. However, only Arapaima fishers and some experienced fishers (middle-aged and older) have the ability to distinguish between individuals. This knowledge seemed to exist prior to training, but fishers lacked the methodology to conduct standardized surveys. Local biologists trained along with the fishers were unable to match the accuracy of the fishers.

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

Iwokrama has conducted a series of training sessions and workshops since 1998, focusing on community development and natural resource management. Many of these projects were facilitated by individuals from Iwokrama, the University of Guyana, Brazilian scientists and fishers, other international scientists, and Government representatives to a lesser extent. Although a number of persons have not been able to access training, most community members interviewed are

**Box 3. Fisheries Committees**

**Community Fishery Committees:** Thirteen Community Fishery Committees have been established to represent the interests of all fishers in each community (fourteenth community is a recent member of NRDDDB). Each committee consists of at least two persons who must be elected and mandated by the community and the village leaders, and who are responsible for enforcing the plan and organizing the fishery.

**Executive Fishery Committee:** This body is part of the NRDDDB and is supposed to bind all Community Fishery Committees together. The Executive Fishery Committee comprises of two positions appointed by the NRDDDB and five positions elected by the Community Fishery Committee members. The EFC is responsible for enforcing the rule of the Plan, monitoring exercises, harvesting, marketing and reporting activities.

The EFC has two additional positions for an officer of the Ministry of Fisheries and another from the Ministry of Local Government and Regional Development. However, plan states that the EFC “will carry out the management plan even if the authorised officers are absent”.

satisfied with the selection process. There also seems to be some amount of knowledge and information sharing between trained and untrained individuals. The Government did participate in many initial workshops and conducted an assessment of the area's aquaculture potential. Its subsequent involvement has been minimal.

3.1.c. *Leadership and key people*

i. *Individuals: What role did they play? How did their role change during the course of the project?*

A number of individuals at different levels are/were integral to the project.

- The president of Executive Fisheries Committee has been a Community Environmental Worker, a village leader, vice chairman of the NRDDDB, and a member of the original Fisheries Task Force. He was involved in the development of the management plan from the beginning, and is responsible for outreach, patrolling, consultations with communities outside of the NRDDDB, and meetings with government officials. For most persons on the ground, he is the face of Arapaima management.

- A Mamirauá scientist led the development of the Arapaima Management Plan. He was closely involved in the Brazilian project, and was present at the Iwokrama-communities fisheries workshop in 2000. He prepared the first draft of the Plan through consultations with key community members and Iwokrama scientists. He then conducted meetings in all 13 communities to present the plan and receive community feedback. He was also involved in the formation of local CFCs. Subsequent drafts of the Plan were prepared and presented to the Guyana Environmental Protection Agency, Department of Fisheries, Ministry of Amerindian Affairs and the Ministry of Local Government and Regional Development. He also met with the then Minister of Agriculture to submit the final draft of the AMP. He has since had very little contact with the project (initially due to funding restrictions) and is no longer with Mamirauá.

- The acting Director General of Iwokrama (formerly Senior Wildlife Biologist) was directly responsible for sourcing project funding, and establishing links between the communities, the Ministry of Amerindian Affairs, the Fisheries Department, and Mamirauá. He facilitated many of the fishery related workshops, and led early outreach activities in communities. He still provides advice to project and is involved in obtaining project funding.

ii. *Key organizations: What role did they play? How did their role change during the course of the project?*

- Scientists and fishers from Mamirauá facilitated knowledge transfer, allowing for scientifically rigorous community-based monitoring. Since training was completed, contact with Mamirauá has been minimal due to funding constraints.

- The NRDDDB acts as the regional representative body, acting as the link/filter between communities, Government, NGOs and other outside groups. The NRDDDB was created in response to the establishment of the Iwokrama Reserve and was thus exclusively associated with Iwokrama projects. It has since become more independent, and has direct relationships with government agencies

and a number of local and international NGOs. The NRDDDB seems to enjoy a high level of community support. Institutions within the NRDDDB, such as the Executive Fisheries Committee and the Community Fisheries Committees act as the official instruments of fisheries management in the area. The EFC still enjoys some amount of authority and respect in the communities, but has not been very active. The village-based CFCs apparently enjoyed broad community support and participation following their formation. However, many committees have since become inactive, non-functional or non-existent. This is partly due to the lack of economic incentive, since the fisher groups are voluntary. In addition, these structures were created primarily to manage quota harvesting. Therefore, a useful assessment of these institutions will only be possible after harvesting re-opens.

- Iwokrama has been the primary facilitator in primary stages of the project. It has sourced funding, created links with Government and other organizations, facilitated training and capacity building and continues to provide support and assistance to the project. It's involvement in the project has reduced as the NRDDDB became more independent. It still offers technical assistance to the project, such as applying for funding and providing scientific advice.
- Government officials were brought into the process through Iwokrama, and gave support in principle to the project. Iwokrama funding also supported a Department of Fisheries study of local aquaculture potential. However, efforts to make the management plan legally binding have stalled due to lack of political commitment at senior Government levels, combined with protracted procedural requirements.

### 3.1.d. Learning

#### i. What learning processes did the project go through?

- A Government study of community fish preferences and local geophysical conditions led to the ruling out of Aquaculture, which was being pursued in the project's initial stages.
- Iwokrama and local fishers attempted to develop a survey methodology, which yielded inconclusive results. As a result, linkages were pursued with Mamirauá, leading to the subsequent transfer of the Brazilian survey methodology. The first survey was carried out in March, while subsequent counts done in November. This was done to take advantage of the optimal survey conditions at this time of year.
- The initial Conservation Contract proposals from river communities focused on habitat/site management. These were later refined to involve the establishment of checkpoints (Box 4). Other

#### **Box 4. Conservation Contracts and Check Points**

Three checkpoints were established to monitor fishing activity along the Rupununi, Rewa and Essequibo rivers. Two of the checkpoints are community projects under Iwokrama's community Conservation Contract program. Conservation Contracts are agreements signed between individual communities and Iwokrama, where Iwokrama makes a payment of G\$360,000 (US \$2,000) over the period of one year, in exchange for a commitment by a community to the management of a specified resource or geographical area during the contract period. The Conservation Contract payment was used to operate checkpoints in the river communities of Rewa and Apoteri communities. The third checkpoint was established under separate funding and is located in a major farming area. Most of these checkpoints are not functioning as planned.

communities have since expressed interest in establishing checkpoints in their locations. There have also been discussions to change checkpoint location to more strategic locations.

- Following the establishment of the ban and other sub-projects, outreach efforts were directed to communities outside NRDDDB that are also known to occasionally use local fisheries. Consultations were run by NRDDDB and project personnel, with no input from Iwokrama. These consultations involved discussions about benefit-sharing and trade, with non-NRDDDB communities requesting membership in the NRDDDB.

- The development of the AMP has led to discussions about a potential “food fish” management plan and its inclusion under the institutions created for Arapaima management.

ii. *Was there adaptive management (learning-by-doing)?*

The project has yet to involve harvesting. However, monitoring mechanisms are active (surveys) or have been modified (checkpoints). Annual Arapaima surveys have been conducted since the beginning of the project. The AMP also identifies adaptive management as a guiding principle of the project, particularly in determining quotas sizes .

iii. *Were there learning networks (self-organized groups consisting of people from different organizations, who are engaged in problem-solving, subsequently recycling their experience to tackle new problems)?*

The Executive Fisheries Committee and the NRDDDB act as networks in a sense. Most NRDDDB workshops, seminars, and bi-monthly board meetings involve Iwokrama personnel and other scientists. These meetings are designed to bring together local and scientific knowledge and experience in a collaborative, problem solving environment.

3.1.e. *Funding*

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

Resources from Iwokrama’s Sustainable Human Development programme, funded by the UK Department for International Development (DFID), were used to finance initial community meetings. It was from these meetings that the idea from the NRDDDB emerged. This funding was also used for early workshops on resource issues and local fisheries management. Subsequent NRDDDB bi-monthly meetings were financed by the Board’s Trust fund. This Trust is a pool of funding from a number of sources, including DFID, IUCN - Netherlands Committee and Iwokrama’s project funds. Although NRDDDB meetings are usually a day, Iwokrama’s community development budget was used to fund a second day of meetings dedicated specifically to Iwokrama-community issues and project updates.

The outcome of the wildlife management workshops in 1998 was summarized in a book, “Community-based Wildlife Management in the North Rupununi” and distributed to communities, other NGOs, and Government departments. The book was also financed by DFID funding.

- ii. *If there was capacity building, including training workshops, who funded it?*  
The training of local fishers by their Brazilian counterparts, and Mamirauá scientists was funded by Mamirauá through a World Conservation Society grant. This funding also paid for the first survey in the North Rupununi. Iwokrama's DFID funding was used for the second survey and counter training; a World Conservation and Food Organization grant was used for the third count; and a combination of private and Iwokrama project funding was used for the fourth survey.

Iwokrama's DFID funding for Sustainable Human Development was also used in the training of Community Environmental Workers (Box 5) and villagers involved in the Conservation Contract programme. Several of the key community members involved in the project also participated in additional Iwokrama training programs (communication and report writing workshops; Forest Ranger Certification program) and other community-based projects (Bee keeping, Aquarium Fish Surveys and GIS mapping of local resource area).

**Box 5. Community Environmental Workers**

The Community Environmental Workers (CEW) programme was launched by Iwokrama in November/December 1999 after a year of consultations with communities, the North Rupununi District Development Board (NRDDB) and the International Board of Trustees. The concept of the CEW originated during the first North Rupununi wildlife management workshop facilitated by Iwokrama and the NRDDB in April 1998. During this meeting community representatives raised the idea of developing community rangers. The idea was further developed during the second North Rupununi wildlife management workshop in July 1998 that also involved Governmental representatives. A CEW was a part-time village worker, working 12 days per month under the joint supervision of Iwokrama and the respective Village/Community Council. The CEWs were paid a stipend by Iwokrama and were tasked with raising awareness, carrying out local research, and were the faces of Iwokrama and NRDDB's environmental education programs, particularly for the Arapaima ban and management. During the course of this study it became apparent that the outreach and awareness activities of the CEWs, and their presence within all of the communities, played a significant role in the social enforcement of the Arapaima ban. However, in early 2003, funding for this project came to an end, and the project is no longer active.

- iii. *If there was funding for office, office personnel, vehicles, etc., who funded them?*  
The physical centre of NRDDB activities is the Bina Hill Institute building (Box 6). The building houses the NRDDB's shortwave radio, Radio Paiwomak (Box 7) and a computer centre with internet access. Internet access was initially set up using Iwokrama and CIDA funding, but is now Bina Hill's responsibility. The institute employs a staff of seven community members and was initially funded by IUCN Netherlands. The institute is currently funded by the British Lottery.



The NRDDDB's boat and engine were purchased with Iwokrama/DFID Arapaima project funding.

3.1.f. *Human resources for initial organization (in-kind work as opposed to money)*

i. *NGO and Government personnel providing their time or services for free*

When possible, Iwokrama allows project personnel and community leaders to use the facilities at its Head Office and Field Station. It also assists with local transportation, particularly for meetings and workshops, providing the use of its vehicles and boats. The Bina Hill building, which acts as the NRDDDB headquarters and a centre for meetings and training activities, was built by a self-organized community group and Canadian Youth Challenge International volunteers, using materials purchased with IUCN funding.

**Box 6. Bina Hill Institute**

The Bina Hill Institute is the base of operations for the NRDDDB, and provides a facility for training and other research activities in the North Rupununi communities. The institute also houses Radio Paiwomak (Box 5) The Institute's building was constructed in 2001, with follow-up development initially supported by IUCN Netherlands. Bina Hill Institute acts as the location for the meetings of the NRDDDB and most regional workshops and training sessions. The Institute falls under the umbrella of the NRDDDB, with close links to Pronatura and Iwokrama. Most of the fisheries surveys for Arapaima and Aquarium Fish used the Institute as a base. Since the conclusion of the field research for this study, the institute has been equipped with a solar powered computer lab, and has conducted a introductory GIS mapping training course with community members.

ii. *Enlisting free help from outside groups.*

Personnel from Iwokrama, Red Thread (Guyanese NGO) and University of Guyana acted as primary contacts between NRDDDB and outside groups. Proposals associated with the Arapaima management plan were prepared by Iwokrama personnel and a Mamirauá scientist, in conjunction with community leaders.

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

The relationship between Iwokrama and the communities existed prior to the formation of the NRDDDB and the development of the Arapaima management plan. This relationship facilitated the creation of linkages with Mamirauá and the Fisheries Department of the Agricultural Ministry. However, the creation of the Iwokrama reserve and organization was the result of a Governmental degree, and communities were not consulted prior to this decision. One of the NGO's first projects in the area was an outreach campaign focused on explaining the purpose of the reserve and its focus on community development. Research and outreach in this initial stage was led by Red Thread (a local NGO) and the University of Guyana. Interviewed villagers felt that this initial stage, along with Iwokrama's continued involvement in community development projects, has laid the foundation for a genuinely collaborative relationship.

3.1.g. *Use of free facilities.*

NRDDDB meetings and related fisheries workshops and meetings take place at the Bina Hill building. The NRDDDB also provides free use of their short wave radio to community members as well as for Fisheries related activities. Workshop and

meeting dates are also announced on Radio Paiwomak (Box 7), the community radio station. Fisheries related public outreach and educational programs are broadcast for a fee. However, recordings from meetings and other associated project information are also broadcast for free at the discretion of the radio operator. NRDDDB computers are also used by project personnel.

**Box 7. Radio Paiwomak**

Radio Paiwomak is Guyana's first and only community radio station. It began as a joint project between the NRDDDB, Iwokrama, UNESCO, the Guyana Broadcasting Cooperation, and the IDRC. Radio Paiwomak is operated by a group of community-based volunteers, and has been broadcasting since 2000. It currently services 9 of the 14 North Rupununi communities, or approximately 75% of the area's population. Broadcasts include health, agricultural, youth, educational and Makushi language programming. Programs also include environmental education and awareness campaigns associated linked to several NRDDDB projects, including Arapaima management. I was fortunate enough to participate in a number of these broadcasts, including a Makushi language interview about my project, which greatly increased local interest in the study.













































































