"More eyes watching..."
Lessons from the community-based management of a giant fish, *Arapaima gigas*, in Central Guyana

by

Damian Fernandes

A Thesis
Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
for the Degree of

Master of Natural Resources Management

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THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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Abstract

This study aims to identify lessons in how community-based conservation can be facilitated. The problems and potential of community-based conservation can only be understood by examining the histories of projects where community-based management has been planned and implemented. This thesis is based on one such examination; a case-study of the Arapaima Management Project in Central Guyana. The objectives of the study were to: a) investigate the role of community self-organisation in the development of the Project; b) examine the role of cross-scale institutional linkages in facilitating or hindering the Project; and c) identify tools or interventions that can be used by NGOs and community organisations to increase governmental support for community-based conservation.

Guyanese law forbids harvesting of the *Arapaima gigas*, but is rarely enforced. The Project includes a community imposed harvesting ban, the formation of fisher groups at village and regional levels, a local monitoring program, river check points, and community education and awareness campaigns. The Project aims to implement a quota based harvesting system in the long term. Field data were collected from July to November 2003, using Rapid Rural Appraisal and semi-structured interviews. A total of thirty-nine (n=39) semi-structured interviews targeting fishery committee members (40%) and Arapaima fishers (~10.5%) were carried out in ten (10) communities. Government officials and NGOs representatives were also interviewed (n=6).

To date surveyed Arapaima populations have increased threefold, suggesting that management is contributing to the conservation of the species. Transfer of management authority to the communities has stalled, largely due to lack of Government commitment at senior levels. Planned harvesting has therefore yet to occur, and no direct income has been generated by the initiative. Project activities appear to have influenced social norms, resulting in informal social pressure that has been more effective in enforcing the ban than more formal mechanisms, many of which are non-functional.

The initiative highlights that local self–organisation for community-based conservation may be best facilitated through: 1) problem definition that involves a fine-scale, community-level approach to capture the perspectives of resource users; 2) a core group of dedicated and committed individuals; 3) external groups that act as key transformative forces; 4) culturally sensitive environmental education and associated changes in social norms; 5) community-based monitoring which draws upon local knowledge; and 6) stock recovery as a starting point for community involvement in management. Effective cross-scale linkages for community-based conservation may be encouraged by 7) individual relationships based on respect, trust and reciprocity; 8) involvement of organisations that can navigate within, and link between, multiple levels of organisation; and 9) State endorsement of community management authority. Some tools or interventions that can increase governmental support for community-based conservation include 10) Local participation in stock recovery; 11) third body recognition and legitimization of community institutions; 12) appropriate training for researchers and managers to effectively navigate the political process; 13) interaction between fishers and Government; 14) activities that increase project visibility, and promote dialogue between Government and Project personnel. In the end, successful community-based conservation may boil down to 15) a good understanding of the local culture and history of resource use in the area; 16) a recognition that effective management takes time to develop; and 17) the right ingredients at the right time.

Acknowledgements

Thanking everyone who helped me on this journey would require its own document. Although preparing such a document would certainly be gratifying, I will defer my gratification for the sake of practicality this once.

Let me begin by thanking the people of the North Rupununi, who welcomed me into their homes and lives during my time in the communities. Without their participation and generosity this thesis would have been impossible, and I would not be the person I am today. Special thanks to the North Rupununi District Development Board, the Bina Hill Institute, Eugene Issacs, Emily Allicock, Ellen Davis and Paulette Allicock for their help, conversation and friendship. Thanks to the Iwokrama International Centre, especially Graham, Aiesha, Deidre, Indrannee, Odacy, Sambhu, Samantha and Shivon, for treating me like I never left, and giving me the space to grow both as a researcher and as an individual.

In Canada, I would like to express my gratitude to the International Development Research Centre, the Social Sciences and Humanities Research Council and the Canada Research Chairs program for their support. I would also like to thank the students and faculty of the Natural Resources Institute, in particular Julie, Jessica, Jane and Manju for making Winnipeg a little warmer. I would especially like to thank my advisor, Dr. Fikret Berkes, who was always generous with his wisdom, guidance and support.

I would also like to acknowledge my family. Thanks to Nanni, for staying with me, even after you left; and to my parents, Robert and Luana Fernandes, for always lending their wisdom, love and shoulders whenever I need them. Thanks to Guy for all your help, and for being there at every step. I would like to thank my brothers and sisters: Christina, for your inspiration and love; Robert, for being the best big brother I could want; Dominic, for making me a better person; Shad, for your special brand of advice; Nicolette, for listening and understanding; Chantelle, for loving me in spite of myself; and René, for helping me to keep the faith. I would also like to thank Lianne and Aisha for being there in the hard times.

Finally, I apologise to all those not mentioned by name, and I am eternally grateful for your support, time and patience. Thanks everybody.

To my parents, for allowing me to dream.

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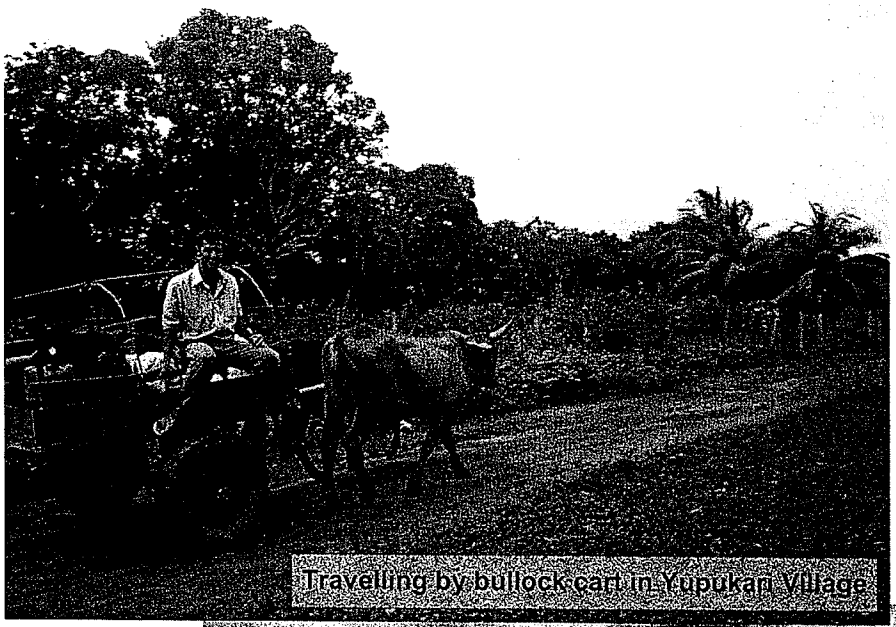
List of frequently used terms and acronyms

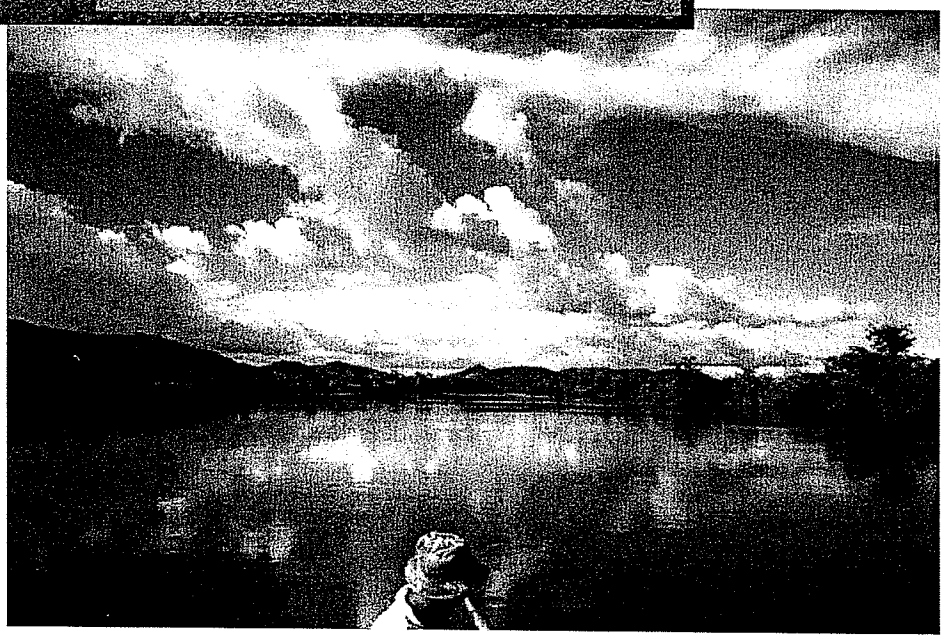
AMP	Arapaima Management Plan
CEW	Community Environmental Worker
CFC	Community Fishery Committee
CIDA	Canadian International Development Agency
DFID	Department for International Development
EFC	Executive Fishery Committee
EI	Equator Initiative
FAO	Food And Agriculture Organisation
IBAMA	Brazilian Institute for the Environment and for Natural Renewable Resources
IUCN	The World Conservation Union
Iwokrama Centre	Iwokrama International Centre For Rainforest Conservation and Development
Mamirauá Institute	Mamirauá Institute for Sustainable Development
Mamirauá Reserve	Mamirauá Sustainable Development Reserve
MFCL	Ministry of Fisheries Crops and Livestock
NRDDB	North Rupununi District Development Board
Piaman	Local shaman
Production Association	Association of Producers of the Jarauá Sector
Touchau	Elected village leader
UNDP	United Nations Development Programme
WCS	Wildlife Conservation Society

Chapter 1

The journey begins



Travelling by bullock cart in Yupukari Village



The Rupununi River by boat

1.1. Of giants and black water

As I sat there, staring at my reflection in the blackness of Crash Water Creek, I kept thinking to myself, "I've made it!" I had survived two semesters of "Social Principles" and "Policy Processes" at the Natural Resources Institute, University of Manitoba, and was finally in Central Guyana for my thesis research. My study was to identify lessons from a community-based project aimed at the conservation of the Arapaima. This strange, air breathing fish is one of the world's largest freshwater species, growing to over three meters in length. Over-harvesting had pushed the species to the brink of local extinction, leading to a community endorsed harvest ban.

That day I was in what used to be a tree, being propelled through black, tannin-stained water by the "put-put" of an outboard engine. Some community members and I were on our way to Crash Water Village to discuss fisheries management with local fishers. Other than the occasional Giant River Otter and Red Howler Monkey, the trip had been uneventful. My mind had drifted to the perversity of snow, when my eye caught some movement in the water. The surface of the creek just off to the side of the canoe had started to bubble. This was not a strange occurrence, particularly with six meter Black Caimans cruising the area. However, the cutting of the engine and the shouts that began to fill the canoe signalled that this was no ordinary event.

Right before our eyes, a circular patch of water about two meters in diameter began to boil. As one can imagine, I was convinced that this was to be the end of both myself, and my research. Luckily, just as my life started to flash before my eyes, someone shouted, *"Arapaima babies!"* We were witnessing a brood of young Arapaima fry surfacing to breathe. The father was just below the surface, aggressively guarding the brood. The fry continued to submerge and surface for a few more minutes, until they disappeared into a cove of Giant Amazon Water Lilies. After regaining control over our bodily functions, we continued on to the community.

Little did I know then that this incident would underscore what was to emerge as a major lesson from the Project. The presence of an adult Arapaima and brood in what used to be

a heavily fished creek was more than just exciting to watch. It corroborated community counts that showed a tripling of the Arapaima population since the Project began, suggesting that the measures taken by local communities were working. It also illustrated that local fishers were committed to self-monitoring, or as my friend from one community put it, *"More eyes watching to see if you catch Arapaima"*. For the next five months of my research, my eyes were certainly *"watching to see"* which aspects of the Project were working, which aspects were not, and why.

This thesis is an attempt to record and understand these observations in a way that, I hope, proves useful to the communities involved, similar community-based projects all over the world, myself as a student, and you as a reader. Enjoy.

1.2. Community-based conservation: tensions and possibilities

The world is currently in the midst of an extinction episode, with species, habitats and entire ecosystems being lost at unprecedented rates (Myers 1988, 1997; Wilson 1992). At the same time, more than 1.3 billion people worldwide are living in severe poverty (Koziel 2001). This situation is particularly acute in many developing countries, where the livelihoods of the rural poor are based primarily on the use of biodiversity (Salafsky and Wollenberg 2000). Governments in these countries tend to place more emphasis on economic growth than conservation and sustainability (Myers 1997). This has often resulted in the rapid loss of biodiversity resources, and the breakdown of traditional, small-scale livelihood activities (Koziel 2001). In many instances, traditional livelihood activities have been replaced by unsustainable practices, such as logging, large-scale agriculture and mining, further degrading biodiversity and perpetuating a vicious cycle of poverty. The correlation between biodiversity loss and poverty is thus far from coincidental. Working with local communities to consolidate the goals of conservation and poverty reduction may therefore offer the best hope in addressing this ecological and humanitarian crisis (Brown 1998).

Greater recognition that biodiversity conservation and economic development cannot be treated as separate, and antagonistic, goals has led to the emergence of the community-

based approach to conservation (Barret and Arcese 1995; Alpert 1996; Abbot et al. 2001; Berkes 2004). Community-based conservation differs from past approaches in that it recognises that social and ecological systems are inextricably linked (Abbot et al. 2001). This approach assumes that by being involved in the decision making process, local communities will develop a sense of ownership for the resource, realising that the long-term maintenance of biodiversity is in their own economic and social interests (Barrett and Arcese, 1995; Forte et al. 1999). Community-based conservation projects often have a number of common characteristics, including: i) a commitment to involve local community members and institutions in the management and conservation of biodiversity; ii) an interest in decentralising power and authority from the state level to local communities and institutions; iii) a desire to link and reconcile the objectives and socio-economic development with biodiversity conservation and protection; iv) a tendency to defend and legitimise local resource and property rights and; v) a belief in the desirability of including traditional values and ecological knowledge in modern resource management (Brown 2002).

However, there are differing views in conservation and development circles as to the practicality of the community-based approach. Some evaluations have been favourable (Alpert, 1996), however, most see community-based management as unproven (Brandon and Wells, 1992), while others suggest that this approach is inadequate in achieving both conservation and development, and usually breaks down in the face of severe poverty (Redford and Sanderson 2002). Thus, there seems to be two positions in the current debate over the merits of community-based conservation. One argues that community-based management, and the attempt to reconcile conservation and development, is inherently flawed (Hackel 1999; Redford and Sanderson 2002). The other position tends to hold that the concept behind community-based conservation is powerful and has potential, but its failure is mostly due to improper implementation (Songorwa, 1999).

Berkes, (2004: 11) responds to this debate by suggesting that:

> "Does community-based conservation work?" is the wrong question. Sometimes it does, sometimes it does not. More important is to learn about the conditions under which it does or does not work."

Further, Berkes argues that a number of emerging fields of research have important lessons to offer to the conservation dilemma, including common property, traditional ecological knowledge, political ecology, ecological economics, and environmental ethics and history. He focuses on five factors that are central to achieving effective community-based management. These include 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 ethic.

Following Berkes (2004), this research examines *"the conditions under which [community–based conservation] does or does not work"* through a case-study of one such community-based conservation project. In so doing, the study attempts to identify "lessons-learned" from the case-study in how effective community-based conservation can be facilitated. Particular emphasis is placed on the aforementioned issues of cross-scale management and adaptive co-management. I will address the latter by examining self-organisation at the local level.

The research case was chosen from among the initiatives identified by the UNDP-led Equator Initiative Programme (EI). The main goal of the Programme is to develop "lesson-learned" in conservation and poverty reduction by highlighting successful community-based initiatives throughout the tropics (UNDP 2002, IDRC 2002). EI aims to use these lessons-learned to foster capacity building, knowledge generation and policy strengthening in other developing countries. Many of the outstanding initiatives identified by the EI demonstrated a high level of "integration of partnerships, sustainability, innovation, transferability, leadership, community empowerment, gender equity, social inclusion, and tangible benefits to biodiversity conservation and poverty reduction" (IDRC 2002). This study will focus on one such initiative in Central Guyana.

1.3. Study area and situational background

This research focused on an examination the North Rupununi District Development Board's Arapaima Management Project in Central Guyana.

1.2.1. The Place

The North Rupununi Savannas, which are approximately 8,000 km^2, form a seasonally flooded plain, known as the North Rupununi Wetlands (Figure 1.1.). These Wetlands are dominated by the Rupununi, Rewa, and Essequibo Rivers, and include over 750 lakes, ponds and inlets covering approximately 22,000 ha. During the rainy season, the Rupununi River floods into the surrounding savannahs 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 savannahs 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, including the Arapaima, which migrated into the area via the flooded savannahs linking the systems. The area is thus globally unique, with extremely high fish species richness for an area of its size (Bicknell 2004).

Over 400 species of fish were recorded in surveys of only three river systems in the area. This has led to estimates of up to 600 species for the area; remarkably high compared to other South American wetlands. Comparable wetlands in South America such as the Varzéa of Mamirauá and the Pantanal wetlands contain 400 and 200 species of fish respectively (Bicknell 2004). The Rupununi, Rewa, and Essequibo Rivers are home to Arapaima (*Arapaima gigas*), and healthy populations of the endangered species Giant River Turtles (*Podocnemis expansa*), Black Caiman (*Melanosuchus niger*), and Giant Otters (*Pteronura brasiliensis*).

1.2.2. The People

The North savannahs are the traditional home of the Makushi people. Although the Makushi are still the primary ethnic group in the area, many communities contain a mixture of other indigenous groups and immigrants from the more populated coast. The primary livelihood activities in the area are subsistence farming and fishing.

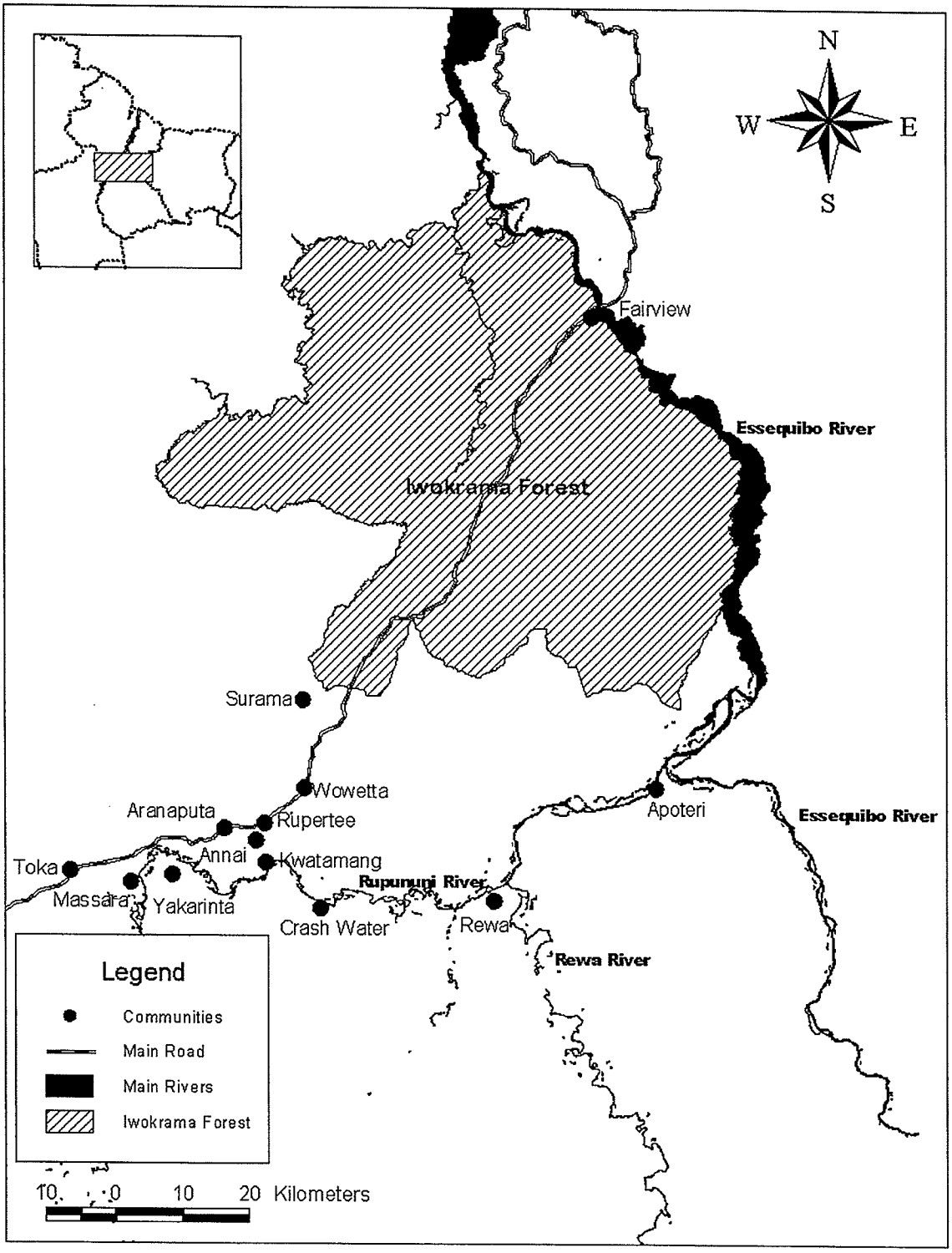


Figure 1.1 – Map of study area

The residents of the North Rupununi are distributed among fourteen primary communities, consisting of approximately 3500 people (MRU 1999). Eight of these communities have legal title to some of their traditional lands. However, most of these communities have historically enjoyed customary rights to their surrounding land and resources. The villages are presently represented by elected Touchaus or Captains. These leaders came together in 1996 to establish the North Rupununi District Development Board (NRDDB), a regional, community-based NGO.

1.2.3. The North Rupununi District Development Board

The North Rupununi District Development Board (NRDDB) is an indigenous community-based organisation, headed by village leaders and other community members from Guyana's North Rupununi District. Its membership includes 14 communities within and surrounding the Iwokrama Rainforest Reserve in Central Guyana (Forte et al. 1999). The NRDDB provides an institutional structure for the coordination of regional development, education and resource management in one of Guyana's poorest regions. This initiative has also played a major role in facilitating interaction between local communities, government, the Iwokrama International Centre (Iwokrama) and the private sector, and has been cited as an institutional model in Guyana's Poverty Reduction Strategy (2001).

Working with the Iwokrama, the NRDDB developed the Arapaima Management Project. The Arapaima (*Arapaima gigas*) is among the world's largest, scaled freshwater fish, and is a "top-of-the-food-web" predator. After stocks of this fish plummeted in the face of increased fishing pressure, the NRDDB and local communities initiated a local ban on Arapaima harvest. Since then, a management plan and a standardised survey methodology have been developed in partnership with scientists and fishers from Iwokrama and the Mamirauá Sustainable Development Reserve in Brazil. This thesis is based on a case-study of the Arapaima Management Project.

1.4. Purpose and Objectives

The purpose of this study is to understand and identify lessons from the Arapaima Management Project in how community-based conservation can be facilitated. In so doing, the research findings may be used in future efforts to implement effective community-based management in Guyana, as well as other nations. This research can also be seen as part of a larger movement towards fully realising the promise and potential of community-based management as a tool for integrated conservation and development.

In order to identify lessons-learned from the Project, the study pursued the following objectives:

i. To investigate the role of community self-organisation in the development of the Project.

ii. To examine the role of cross-scale institutional linkages in facilitating or hindering the Project.

iii. To identify tools or interventions that can be used by NGOs and community organisations to increase governmental support for community-based conservation.

1.5. Methodology

My fieldwork was conducted from July to November 2003. Research methods involved a combination of archival review and Rapid Rural Appraisal techniques, including informal and semi-structured interviews, participant observation, and a focus group session. I used these techniques 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-nine (39) semi-structured interviews were carried out with community members from ten (10) communities (see Appendix 1). I conducted additional interviews

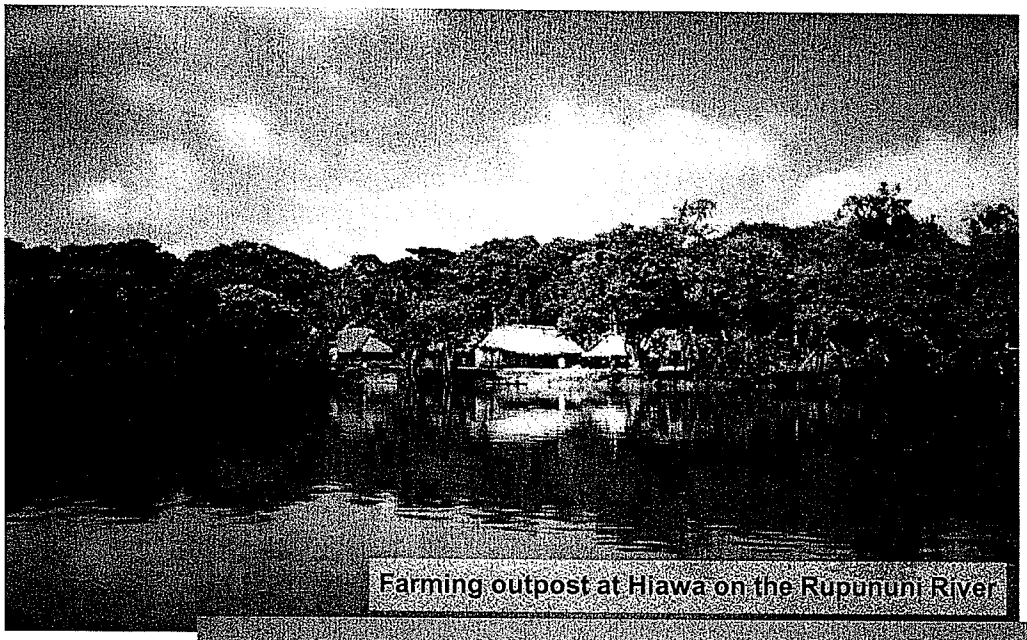
with four (4) Government officials and two (2) NGOs personnel involved in the conservation project. A focus group session was used to perform a timeline analysis and an institutional mapping exercise. The session was attended by twenty-one (21) participants from eleven (11) communities, including fishers, leaders and community project personnel. Many of these individuals had been involved in either semi-structured interviews, informal discussions, or both, prior to the meeting. I also used participant observation to gather data during my involvement with community meetings, daily household activities, and project outreach. Archival research was also conducted to examine changes in fisheries legislation, historical Arapaima use, and changes in traditional resource use practices (Detailed account of methods provided in Chapter 3).

1.6. Organisation of the thesis

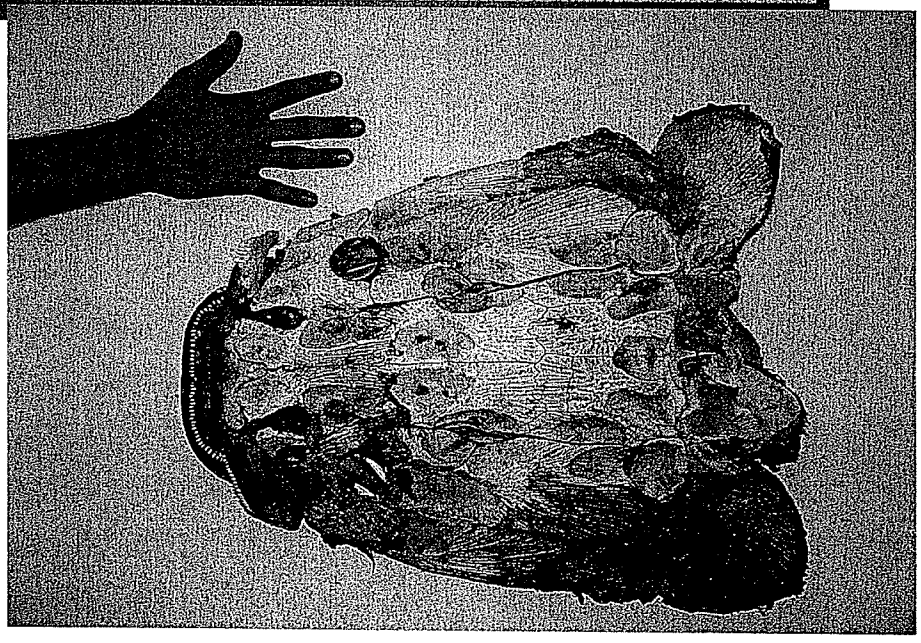
This thesis is organised into seven chapters. Chapter One introduces the research and outlines the study's purpose and objectives. Chapter Two follows with a discussion of the theoretical basis for analysing community-based conservation and small-scale fisheries co-management. Chapter Three then provides a detailed description of the research methodology. Chapter Four examines the history of the study area, focusing specifically on change in both formal and informal natural resource management institutions. Chapter Five reviews the primary drivers behind the development and implementation of the Arapaima Management Project, focusing specifically on the role of community self-organisation. In Chapter Six the discussion turns to cross-scale institutional linkages, and the impact of these relationships on Project development and implementation. Chapter Seven then concludes the thesis, by summarising the lessons drawn from the Project, and how they relate to community-based conservation in general.

Chapter 2

Community, conservation...where to start?



Farming outpost at Hiawa on the Rupununi River



Researcher's hand alongside an Arapaima skull

2.1. Introduction

This research attempts to identify lessons in conservation and development, focusing specifically on community self-organisation and cross-scale institutional interactions in a small-scale fisheries management project. I therefore use this chapter to examine published literature and previous work in these fields in order to better analyse and understand the Guyana case-study.

The chapter begins with an examination of the conceptual and practical understanding of community-based conservation. The discussion then turns to the benefits of local knowledge and institutions, with a cautionary note on their limitations and how communities have traditionally been conceptualized. This is followed by an examination of biodiversity, and the livelihoods approach to sustainable community development. The subsequent discussion then uses systems thinking to understand the theoretical and practical aspects of community self-organisation. This discussion continues with an examination of cross-scale institutional linkages and arrangements. Small-scale fisheries are then described, with specific attention being paid to the cross-scale arrangement involved in co-management. I follow this with a look at Arapaima management in the Amazon, and the Brazilian initiative upon which the Arapaima management project in Guyana was based. The chapter concludes with a summary of the literature reviewed.

2.2. Community-based conservation

Community-based conservation (CBC), as a means of achieving integrated conservation and development, has emerged as the dominant paradigm among non-governmental, national and international organisations. The emergence of CBC is part of a larger international movement to develop new approaches to environmental and social advocacy that link social justice and ecological health (Brosius et al. 1998). This movement is critical of the separation between advocacy for nature and advocacy for people, recognising that environmental health is intricately linked to issues of poverty, justice and indigenous rights (Brosius et al. 1998).

In particular, this movement has promoted community-based conservation and management as a means of integrating conservation and development goals at the local level. This was in response to decades of conflicting ideologies behind the conservation and development agendas of NGOs, government and donor agencies. On one hand, many development programmes were driven by traditional economics, which viewed natural resources as sources of capital to be developed, and considered the resulting environmental costs as "externalities". Conservationists, on the other hand, often pointed the finger at development programs as the primary reason for increasing Global biodiversity loss. Typical conservation in the past has therefore focused on the creation of exclusionary protection area regimes, ultimately to the detriment of local communities (Wells 1992). These dichotomous views have inevitably led to years of deep entrenchment at both sides of the ideological debate, while the cycle of poverty and biodiversity loss continued unabated.

The community-based approach to conservation often strives to reduce poverty through the conservation and sustainable use of biodiversity. Little (1994:348) defines community-based conservation as "voluntary initiatives involving a minimum of several households in which at least one of the outcomes of local management practices is either the maintenance of habitats, the preservation of species, or the conservation of critical resources, and another outcome is improvement of social and economic welfare".

Although there is overwhelming rhetoric in support for the integration of conservation and development agendas, community-based conservation still means different things to different people. Conservatisms tend to see local involvement and community participation in resource management as a means of maintaining environmental integrity. On the other hand, development professionals often interpret the approach as a means of maintaining a local pool of resources that supports sustainable development at the community level. Conversely, indigenous groups often see community-based initiatives as a means of gaining respect and increased recognition of indigenous rights, culture and knowledge (Brosius et al. 1998). Who defines the focus of a community-based conservation initiative therefore has significantly influence on how the core objectives of

conservation and development are approached. Even at the community level, there are a diverse range of perspectives and problem definitions. This is often ignored in community-based initiatives, where the generic use of "community" assumes a static and homogenous entity (Brosius et al. 1998; Agrawal and Gibson 1999; Brown 2002). Although the underlying assumption of successful community-based conservation is that the community can influence decision-making and problem definition (Little 1994), attention must also be paid to the power structure, diverse players and perspectives involved at the community level (Agrawal and Gibson 1999).

The community centric approach to conservation stresses complementarities and trade offs in place of conflict between conservation and development (Brown 2002). For example, one of the failures of past protected area, "fences and fines" approaches to biodiversity conservation, is that they ignored the link between human livelihoods and conservation. Community-based conservation strategies, however, are often based on the "indirect" and "direct" understanding of the livelihoods-conservation linkage (Brown 2002).

An approach based on indirect linkages tends to focus on compensation or substitution of alternative livelihoods to offset conservation related community costs. Compensation can take the form of monetary or development related incentives given to the community as a form of "payment" for restrictions on resource use (Abbot et al.2001). Substitution, on the other hand, prescribes the development of alternative income sources or livelihood options in place of those restricted by conservation. This may also involve the promotion of new agricultural technologies to increase the value of livelihoods based activities outside of the area being conserved (Abbot et al. 2001; Brown 2002). In many cases, this involves the development of buffer zones around protected areas or the creation of biosphere reserves. Although these approaches may seem conceptually straightforward, they often backfire in practice. In some cases, compensation and substitution promote the further commoditisation of biodiversity, and increased income generation. In turn, local residents are better able to access new technology, and thus become more efficient at extracting these resources (Langholz 1999). In the end, compensation and substitution

may lead to acceleration in destructive practices as local communities attempt to capitalize on the increased value of these livelihood options.

More often, community-based conservation recognizes a direct linkage between conservation and livelihoods. This direct linkage recommends that focus is placed on increasing the value of the species and areas being conserved, so that they make a larger contribution to local livelihoods and well-being. As such, a dependent relationship between biodiversity and user groups is developed, with local communities benefiting directly from the conservation initiative. The value of this biodiversity will thus, in theory, provide local incentives for conservation. Rather than just being compatible, the livelihoods of resource users drive the need for conservation (Brown 2002). This approach requires effective institutions, and supportive ownership and access rights (Salafsky and Wollenberg 2000). Without control over access to recourse and benefits, there is little incentive for resource users to engage in conservation, creating conditions that often lead to the overharvesting of resources (Ostrom 1990)

Although community-based conservation has been heralded as the "only realistic option", many of these initiatives have had mixed results, failing to live up to expectations in many cases. Some argue this failure is due to the impracticality of integrating the goals of conservation and development (Redford and Sanderson 2002, Brandon and Wells 1992; Bareett and Arcese 1995), bringing the conservation versus development debate full circle. Other authors have argued instead that the problem may lie in the continued separation of the two objectives in practice (Stocking and Perking 1992; Murphree 1994; Koziell 2001; Berkes 2004). Abbot et al. (2001:02) comes to the conclusion that:

> The jury is still out on the ICD [integrated conservation and development] approach. Yet given the broad range of activities that can come under the umbrella of an ICDP (project), it is unlikely and undesirable, that ICDPs can be categorized definitively as successful or failing. The different modes, scale and length of implementation, and the specific geographical, ecological, cultural and socioeconomic contexts in which they are implemented, make generalizations about ICDPs problematic.

In the end, community-based conservation can only be understood by examining the histories of projects where community-based management has been planned and implemented (Brosius et al. 1998). It is through these examinations that a clearer picture of the problems and potential of community-based conservation can emerge.

2.3. Community, local knowledge and institutions

The shift from centralized, command and control management approaches to increased community involvement has been accompanied by increased interest in local management practices, institutions and knowledge. According to Brosius et al. (1998:02) the community-based approach is based on the premise that "...local populations have a greater interest in the sustainable use of resources than does the state or distant co-operate managers; that local communities are more cognizant of the intricacies of local ecological processes and practices; and that they are more able to effectively manage those resources through local or 'traditional' forms of access".

The conventional centralized approach to resource management has proven to be inadequate in the face of environmental complexity and the needs of local communities. This top-down management approach usually involves a system of rules and restrictions imposed by state level institutions on local communities (Berkes 1996; Ostrom et al. 1999). According to Chambers (1997), this top-down paradigm tries to justify standardization in development as a means of minimising administrative costs, streamlining monitoring and evaluation, as well as facilitating democratic uniformity and prompt spending. However, these advantages of standardisation address bureaucratic concerns, while ignoring the diversity of local situations. The transfer of "pre-packaged" technologies and approaches to local communities in the name of conservation and development has resulted in numerous misfits and incompatibilities (Shiva 1993; Chambers 1997). It often employs a reductionistic approach to science that does not take into consideration the complexity of social and ecological systems. This approach has generally led to conflict among local communities and the state, as well as unsustainable management practices.

As mentioned by Brosius et al. (1998), one important benefit of involving the community in conservation and development initiatives is that communities often possess significant knowledge and understanding of the resources being conserved. This local or traditional knowledge represents a "cumulative body of knowledge, practice and belief..." generated by local communities that have existed in close association with complex natural systems for hundreds of years (Berkes 1999:08). It therefore represents a more holistic and "hands-on" understanding of local environments and ecosystems, not commonly possessed by western scientists and resource managers. The incorporation of this type of in-depth, temporal information in resources management can therefore address a major shortfall of western scientific approaches.

According to Berkes (1999), local and traditional knowledge (LTK) is a knowledge-practice-belief complex with characteristics at four levels. At its most basic level, LTK involves the knowledge of organisms and the local landscape. A prime example of this is the use of LTK in the survey of bowhead whales in the Beauford Sea (Freeman 1992; Striplen and DeWeerdt 2002) and Arapaima fish populations in the Amazon (Castello 2004). This observational information forms the basis for local management systems, which represent the second level of the LTK complex. Examples of these systems include the use of fire (Striplen and DeWeerdt 2002) and shifting agriculture (Berkes et al. 2000) by local cultures in traditional agriculture and biodiversity conservation. These management structures, in turn, depend on a higher level of social institutions that govern local decision-making and cooperation. A good example of this is the successful Maine lobster fishery (Berkes et al. 2000), which is managed by the fishers, who impose a series of self-devised rules and graduated sanctions. These three levels of the LTK complex fall within a broader worldview, which provides a structure of values and beliefs, within which environmental observations are placed.

Local institutions, which encompass local knowledge and management practices, are of particular relevance in community-based conservation. This is because, in most cases, much of the biodiversity to be conserved is found outside of protected areas and under open access or common property ownership regimes. Many local communities, through

de jure or *de facto* ownership, have developed a wide range of formal and informal institutions to manage common property resources.

At its simplest, an institution can be defined as "rules-in-use" (North 1990, Ostrom 1992). Institutions structure social norms and the kinds of activities that are pursued within a particular society. These institutions can either be formal, encoded in laws and policies, or informal, and encoded in belief systems. Informal institutions are often endogenously enforced, "upheld by mutual agreement among the social actors involved, or by relations of power and authority between them" (Leach et al. 1999:16). In many traditional cultures, the lack of formal institutions underscores the importance of informal or "invisible" rules and codes of behaviour. These informal institutions are often built upon a belief system that incorporates the local folklore and mythology (North 1990).

Local institutions represent locally devised solutions to address the challenges of managing common property; including exclusion or the control of access to the resource; and subtractability, that is, the capability of each user of subtracting from the welfare of others (Berkes 1996). Most local institutions are constructed in response to the specific environmental conditions and needs of local communities. They can range in management approach from a system of communal rights to private and separable property rights (Ostrom 1992). These institutions are very locally adapted and diverse, with an emphasis on feedback learning and adaptation (Berkes 1996). Compared to western "recipe" approaches, local institutions are more geared towards the maintenance of biodiversity as a resilience mechanism in adapting to environmental change (Shiva 1993; Chambers 1997). These characteristics form the basis of Ostrom's (1990:90) classic work on the design principles for crafting robust, common pool resource institutions (Table 2.1). Local institutions, and their diversity, are thus often more effective in achieving sustainable use than formal state imposed institutions due to their flexibility in responding to environmental and social change.

Conservation of biodiversity can thus only be achieved through a participatory approach to community development that builds on existing local institutions. Emphasis should be placed on information sharing and capacity building, through situation specific outreach

and extension programs. Therefore, local institutions are given access to information that will assist in identifying present and potential conservation problems, as well as possible solutions (Ostrom 1992). Facilitating greater dialog between the State, NGOs, donor agencies and the local community is a necessary step towards effective community-based conservation.

Although the benefits of community-based approaches are clear, caution is needed in conceptualizing communities and local institutions. The term "community" in community-based conservation often assumes a small, homogenous entity without internal conflicts, using locally developed rules to manage resources sustainably and equitably (Brown 2002; Agrawal and Gibson 1999; Leach et al. 1999). This view fails to recognise the complex and dynamic nature of most communities, and does not recognise the variety of local actors and interests in conservation programmes. The unequal distribution of power within communities can also define access to resource benefits and who participates in decision-making processes. Therefore, in order to better understand the meaning of community in conservation and development initiatives, a more political approach is needed (Agrawal and Gibson 1999). This approach focuses more on multiple interests and actors within a community, how they interact, and what institutions shape these interactions.

In addition, the concept of communities, now or in the past, in harmony with their environment is often simplistic. Like that of western, centralized approaches to conservation, the limitations of local knowledge and institutions must also be recognised. In some cases, environmental change may occur within a very short period of time. In these instances, local knowledge and institutions may not be able to immediately cope with change, while the ability of western science to gather synchronic data would prove more robust.

Table 2.1 – Ostrom's (1990:9) design principles for robust, common pool resource institutions

1. *Clearly Defined Boundaries*
The boundaries of the resource system (e.g., irrigation system or fishery) and the individuals or households with rights to harvest resource units are clearly defined.

2. *Proportional Equivalence between Benefits and Costs*
Rules specifying the amount of resource products that a user is allocated are related to local conditions and to rules requiring labour, materials, and/or money inputs.

3. *Collective-Choice Arrangements*
Most individuals affected by harvesting and protection rules are included in the group who can modify these rules.

4. *Monitoring*
Monitors, who actively audit bio-physical conditions and user behaviour, are at least partially accountable to the users and/or are the users themselves.

5. *Graduated Sanctions*
Users who violate rules-in-use are likely to receive graduated sanctions (depending on the seriousness and context of the offence) from other users, from officials accountable to these users, or from both.

6. *Conflict-Resolution Mechanisms*
Users and their officials have rapid access to low-cost, local arenas to resolve conflict among users or between users and officials.

7. *Minimal Recognition of Rights to Organize*
The rights of users to devise their own institutions are not challenged by external governmental authorities, and users have long-term tenure rights to the resource.

For resources that are parts of larger systems:
8. *Nested Enterprises*
Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

Also, some local institutions and practices may prove to be outright unsustainable and damaging to the environment. In other cases, communities may have lost much of their traditional knowledge due to a breakdown of social institutions (Berkes 1999). Community-based conservation therefore requires a combined approach, using western strategies and local approaches to achieve effective conservation and development.

2.4. Biodiversity and sustainable livelihoods

Although community-based conservation includes development objectives, the term and approach often reflects a conservation bias. This is linked to the current promotion of biodiversity conservation as a means of sustainable development by a number of environmental and development agencies (UNEP, UNDP, FAO, DFID, IISD, and CARE just to name a few).

The term biodiversity encompasses the web of life, or biological capital, found in an area. It includes the variety of life in all of its forms, ranging from the genetic, individual and species levels, to larger ecosystems. An apt definition of biodiversity may therefore be: "the living creatures, including humans, which form a community in an ecosystem, interacting with one another and the air, water and soil around them" (UNEP 2000). Biodiversity provides a number of functions that make human existence possible. These services include subsistence, income, and environmental services such as habitat, fertile soils, and clean air and water, just to name a few.

The variety of products provided by biodiversity allows for diverse livelihood options within many communities, particularly those still heavily dependent on local resources. Although the majority of the world's biodiversity can be found in developing countries, many local or rural communities within these countries experience severe poverty and depend almost solely on biodiversity for their livelihood needs. This dependence often results in poor communities being particularly vulnerable to biodiversity loss. However, many residents within these communities often have to give priority to satisfying immediate needs and day to day survival, which, ironically, can lead to the unsustainable use of biodiversity. Biodiversity conservation and linked livelihood activities are

therefore vital to the long term survival of significant populations in developing countries.

Addressing the complex relationship between poverty and biodiversity becomes even more complicated when one considers the diverse cultures and societies that make up 1.3 billion people living in severe poverty world-wide (Koziel 2001). Past development projects in these countries often dealt with this diversity by implementing uniform, top-down projects. This "model" approach was often ill suited to local conditions and often led to the breakdown of traditional, and in some cases sustainable, livelihood practices (Chambers 1997, Shiva 1993). The widespread failure of this approach has led to the development of new, more flexible methods of poverty reduction. One such method is the sustainable livelihoods approach.

The sustainable livelihoods approach recognises the varying causes and scope of poverty, and the diverse livelihoods that can be pursued under these conditions (Koziell 2001). This approach may involve policy development and local projects that build on local skills and resource availability in an effort to achieve livelihood improvements and sustainability. Scoones (1998:05) defines a livelihood as "*...the capabilities, assets (including both material and social resources) and activities required for a means of living*" and goes on to describe a sustainable livelihood as one that "*...can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base.*"

In order to assess livelihood sustainability, Scoones (1998) suggests that five key elements must be taken into account. These include: 1) the ability of a livelihood to create working days or gainful employment for a certain part of the year; 2) poverty reduction; 3) well-being and capabilities; 4) livelihood adaptation, vulnerability and resilience, which means the extent to which livelihood strategies can adapt or buffer against shocks and stresses; 5) natural resource base sustainability. The fourth and fifth elements of this framework are vital to the definition of sustainable livelihoods. The former of these two elements deals with the ability of the livelihood to cope with shocks (sudden and

unpredictable e.g., natural disasters, economic devaluation) and stresses (predictable, less intense but extended e.g., droughts, seasonal changes), which underlies the ability of a livelihood strategy to cope with and adapt to change. Similarly, natural resource sustainability deals with the ability of the ecological system to maintain productivity in the face of shocks or stresses.

The role of biodiversity in buffering the effects of change is vital to achieving sustainable livelihoods. In terms of sustenance, biodiversity provides a variety of species, and thus a number of options to choose from during shocks and stresses. Diversity at the genetic level and seasonal variability can also safeguard against conditions such as unpredictable climates and disease outbreaks. High levels of biodiversity can also guard against economic shocks by acting as an income source when other livelihood activities fail.

The relationship between sustainable livelihoods and biodiversity exists within larger complex systems. Understanding the complexities of this relationship therefore require the application of complex systems theory, with a focus on resilience and the links between social and ecological systems.

2.5. Systems view, resilience and self-organisation

Systems view considers the "context of the larger whole," (Capra 1996) and represents a major shift from conventional equilibrium thinking. It acknowledges the complexity and intrinsic uncertainty in natural systems and recognises that social and ecological systems are linked. This approach builds on past attempts at holistic thinking among different scientific disciplines, including organismic biology, Gestalt psychology and ecology (Capra 1996). Besides uncertainty, the system approach also recognises that complex systems display attributes not often found in simple systems, including: emergence, scale, non-linearity and self-organisation (Levin 1999). These characteristics have a number of implications for sustainable livelihoods and the conservation of biodiversity.

For instance, many livelihood strategies, and the resources on which they depend, demonstrate varying degrees of resilience, which is an emergent property of complex

systems. Resilience refers to the capacity of a system to absorb disturbance or change (shocks, stress), and has three defining characteristics (Resilience Alliance, 2003):

- The amount of change the system can undergo and still retain the same controls on function and structure
- The degree to which the system is capable of self-organisation
- The ability to build and increase the capacity for learning and adaptation

Resilience is a characteristic of both ecological and social systems, and is useful in understanding the sustainability of linked social-ecological systems (Holling et al. 1998). In ecological systems, for example, change usually involves a repeating four-stage cycle of renewal (establishment of pioneer species), conservation (the development of the climax stage), creative destruction (environmental surprise and the release of natural capital) and reorganisation. Ecological resilience thus depends on the ability of the system to stay on the same path of development during the four-stage cycle. This cycle of change and reorganisation is also present in social systems, where crisis can precipitate learning, innovation and the redesign of coping mechanisms towards sustainability. Therefore, the value of using the concept of resilience to understand linked social-ecological systems is its use in "...analysing how to maintain stability in the face of change. A resilient social-ecological system, which can buffer a great deal of change or disturbance, is synonymous with ecological, economic and social sustainability" (Berkes et al. 2002:15). Using resilience to investigate social-ecological sustainability would therefore require further exploration of it subcomponents, including self-organisation, learning and adaptation (see Resilience Alliance 2003).

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 by allowing for 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 evolutionary 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.

The role of community innovation and adaptation in the development of a community-based conservation project is key to the project's success. A large body of evidence suggests that halting local-level, common-property resource degradation requires that a strong role be played by communities (Baland and Platteau 1996). I would surmise that projects based on community driven problem definition, and project planning and implementation and decision-making have the most legitimacy at the local level, and the highest potential for real participation. These projects would tend to be based on objectives and decision-making that best reflects the goals of the community.

Community-based conservation projects, and supportive inter-organisational collaboration, can emerge in three primary ways, such as vision-led; planning-led; and learning-led forms of organisation (Westley and Vredenburg 1991). These approaches to project development and collaboration each has a number of strengths and weaknesses, which can affect the project differently in the planning and implementation stages. For instance, planning-led forms of organisation are often mandated by Governments, and are thus particularly strong at resource mobilisation. However, issue definition and action mobilization are often weak, since this approach often fails to cope with the complexity of local conditions, and is sometimes insufficient at representing all stakeholders adequately. Although this approach focuses on collaboration, it reflects more of the top-down paradigm to resource management, where the collaboration is "...subsumed into the bureaucracy of government..." (Westley 1995:412).

Vision-led forms of organisation often originate through the leadership of a visionary. Leadership can play an important role in community self-organisation for conservation and development, since local leaders are often strong in issue definition and action mobilization at the local level (Westley 1995). Such leaders usually include individuals "...with new ideas to address major problems who are relentless in the pursuit of their visions, people who simply will not take 'no' for an answer, who will not give up until they have spread their ideas as far as they possibly can" (Bornstein 2004:1). These individuals are often skilled at mobilising resources from non-conventional sources, including private donors and community members (Westley 1995). Although this approach tends to avoid the restrictions of donor agencies and government grants, it may not be realistic in cases where community resources are already severely limited. Vision-led initiatives also tend to become over-dependent on these key individuals, who in turn tend to resist the institutionalization of project structure and activities (Westley 1995). Therefore, in order to reduce this dependence and ensure the survival of vision-led initiatives, a stable and capable core team is required (Pinkerton 1989). This team must be capable of "routinizing" project processes, and turning visions into lasting structures.

In comparison, learning-led initiatives often emerge through group or community level reaction to certain stimuli or concerns. Although action is triggered by individuals, these individuals respond simultaneously and may not necessarily be visionaries; "...like setting a match to dry kindling..." as Westley (1995:412) puts it. In this case, action may first emerge through a small initiative, which will then lead to a number of additional projects all sharing a similar, by initially unplanned, purpose and direction (Westley 1995). This approach is most effective at problem definition, and is comparatively independent of key individuals and external influences. However, learning-led initiatives often lack an institutional foundation, which can put them at a disadvantage in resources mobilization and collaboration with established outside groups. This dependence on external resources and the disparity between learning-lead groups and more powerful external groups can often lead to some distortion of the initiative's original focus (Westley 1995). Furthermore, the lack of resources to sustain learning-led efforts often result in initiatives

that are "...temporary coalitions that enter into negotiations within the problem domain for a period of time and then disappear" (Westley 1995:414).

2.6. Cross-scale linkages and co-management

Another aspect of complex systems is that they exist at a number of different scales in both time and space (Levin 1999). Most ecological and social systems exhibit hierarchical organisation, with each level similar, but somewhat independent of other levels, and operating under slightly different principles (Berkes 2002). For instance, the concept of biodiversity involves the different components of genetic, species, and ecosystem, whereas social systems include such levels as household, community, region and nation. A complex system thus cannot be understood by examining any one level in isolation. Effective management must therefore 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, while vertical linkages refer to the relationships between different organisations 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). This approach places a strong emphasis on regulatory mechanisms, and is frequently based on universal scientific methods, such as Maximum Sustainable Yield and fixed quota systems. In addition, planning is removed from the resources being managed and the local reality in which they exist. Centralised management institutions are slow to react, and often ineffective in incorporating feedback from management outcomes and ecosystem change into future management. In addition, many state level institutions have a tendency to become more bureaucratic as the importance of administration for its own sake overtakes the importance of its core responsibilities (Marriott 1997).This mismatch of scales results in the loss of ecosystem resilience and the movement of natural systems 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).

Unlike centralised approaches, traditional local-level management institutions more often recognise the inherent complexity and multi-scale nature of natural systems (Folke et al. 2002). These locally developed institutions usually maintain a close relationship with the immediate environment, with management often relying on traditional knowledge and feedback learning (Berkes 1999). Local-level institutions are thus often best suited for the conservation of and development of biodiversity at the community scale. Unfortunately, centralisation, and its emphasis on universal western scientific approaches, has also undermined locally developed knowledge and management institutions. In addition, community level institutions, due to their local focus, may be ill-equipped to cope with multi-scale environmental and socio-economic forces on their own. Many community-based efforts tend to overemphasise the virtues of community institutions as much as centralized approaches underemphasise them (Barrett et al. 2001, Pomeroy and Berkes 1997, Berkes 2004).

According to Barrett et al. (2001:500) effective conservation institutions at any level requires four basic characteristics, including: "the authority, ability and willingness to restrict access and use; the wherewithal to offer incentives to use resources sustainably (which in some cases may mean no use at all); the technical capacity to monitor ecological and social conditions; and the managerial flexibility to alter the array of incentives and the rules of access so as to cope with changes in the condition of the resource or its users." Since governments often retain the majority of power in developing countries, state sponsored interventions are vital to strengthening community level management institutions. 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, 1992). However, community institutions cannot be revitalized in isolation. The development of new legal, administrative and institutional arrangements by the State must complement local-level institutions.

However, state sponsored empowerment of local communities is often difficult, since there is little incentive for governments to relinquish their power (Lele 2000). It is therefore important to identify conditions that encourage state support for community-based initiatives and government transfer of resource rights to the local level. There is also need to characterise and understand the institutional forms that facilitate cross-scale interactions between the government, NGOs and communities. Berkes (2002) suggests a number of institutional forms that have potential for cross-scale linkages. These forms are evident in co-management agreements, multistakeholder bodies, development organisations, citizen science groups, policy communities and social movement networks (Table 2.2).

Community-based conservation projects are often structured under co-management arrangements. Collaborative management or co-management is often defined as the sharing of responsibility between state and community (Berkes et al. 1991), but may include broader definitions such as "a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources" (Borrini-Feyerabend et al. 2000:01). Carlsson and Berkes (2005:15) offers a more complex view of co-management, suggesting that in reality, co-management arrangements are often networks, or "webs of agreements forming a system of relations to public authorities, companies and other actors." He argues that the state is not homogenous, and that co-management arrangements can be tailored to take advantage of this fragmentation, reduce transaction costs and make management cheaper.

Co-management is best presented as a continuum, from the simple exchange of information to formal control or partnerships (Berkes et al. 2001). Finding this best balance is dependent on specific situations, with total self-management leaving the communities open to powerful outside forces, such as market mechanisms, while excessive alignment with the state may reduce the community to a tool for public policy (Carlsson and Berkes 2005).

Table 2.2 – Characteristics of vertical cross-scale linkages (Source: Berkes, 2002)

Institutional form	Vertical Linkages	Power Sharing	Area of Emphasis
Co-management	Local-level users with the government level	Formal power sharing in partnership	A mechanism to enable local-level users to participate in management
Multistakeholder bodies	Multiple user groups and interests with the government level	Often advisory	Often a tool for public participation
Development empowerment co-management organisations	Often a three way relationship with users, NGOs, and government agencies	Rarely formal power sharing	Social development, empowerment
Citizen science	Local activist groups with government agencies	Information and policy partnerships but rarely formal power-sharing	Citizen activism for environmental management
Policy communities	The local level with the regional and international	No formal power sharing	Solving regional problems, with local input

Co-management is seen as beneficial because it often requires partners to combine the strengths and resources of multiple actors across different levels of organisation to mitigate the weaknesses of each (Berkes and Pomeroy 1997).

Examining the structure and performance of cross-scale institutional arrangements, particularly co-management, in specific project histories is therefore important. Through these examinations, it may be possible to identify cross-scale structures and institutional arrangements that foster or impede community-based conservation. A better understanding of these institutional arrangements may also suggest ways in which communities can maintain and enhance state-sponsored strengthening of local-institutions.

Although focusing on the relationships and institutional interplay across scales is important in conservation efforts, communities must still play a central role in resource management. Cross-scale conservation must therefore start at the lowest level of the organisational hierarchy, with planning being "bottom-up". This is important "... for the simple reason that conservation cannot be achieved without the co-operation of the local people" (Berkes 2004.). Appreciating the role of local level participation in management is therefore critical in understanding the dynamic nature of cross-scale linkages.

2.7. Small-scale fisheries

Approximately 50.5 million fishers, out of an estimated 51 million globally, are involved in some aspect of small-scale fisheries. Small-scale fisheries, although found in industrialized countries, dominate in the developing world, and the numbers of small-scale vessels and fishers often greatly exceed those in industrial fisheries (Apostle et al.. 1998). FAO figures suggest approximately 95 percent of small-scale fishers operate in developing countries and produce about 58 percent of the 98 million metric tons of the annual marine fish catch (Berkes et al.. 2001). Small-scale fisheries include traditional, artisanal and subsistence fisheries, and tend to be multi-species, multi-gear, and multi-scale (World Bank 2004). They may include both mechanized and/or include traditional fishing gears. Compared to large-scale fisheries, harvests usually focus on a wide variety

of species and stocks distributed over a number of management units (Berkes 2003). Although this type of fishery accounts for most of the fish used in direct human consumption (Berkes et al.. 2001), small-scale fisheries have been marginalized throughout the world by governments and policies that emphasize on large-scale, industrialized fisheries

Small-scale fisheries management has typically involved a centralized approach that emphasizes western science and stock assessments based on static concepts, such as Maximum Sustainable Yield. This approach is not only flawed, but is particularly inappropriate in addressing the complexities of small-scale fisheries and the communities that depend on them (McConney and Mahon 1998, Charles 2001, World Bank 2004). As Berkes (2003:8) puts it "conventional fishery science has not adequately addressed the socioeconomic needs of fisherfolk, livelihood issues, integrated management of coastal resources, and the potential of interdisciplinary, participatory approaches to meet these needs".

In most developing countries, government agencies responsible for fisheries management have little control over small-scale fisheries or the communities that rely on them (World Bank 2004). In addition, local institutions governing access and use of fisheries resources are either absent or facing growing pressures from both internal and external forces. Co-management has therefore been widely advocated in small-scale fisheries management, since it allows for a combination of resources and strengths to offset the weakness of the groups involved in management (Berkes et al. 2001; Virdin 2000). For instance, engaging fishers in decisions-making and management inherently leads to a larger knowledge base on which management decisions are made. The knowledge held by fishers may be extremely detailed and relevant for resource management, and the combination of this local knowledge with scientific knowledge can make co-management stronger than either community-based management or government management (Pomeroy and Berkes 1997).

However, a major obstacle to small-scale fisheries co-management is the reluctance of government resource managers to share management power and authority. A

fundamental concern of governments and managers is whether resource users can be trusted to effectively manage their resource (Pomeroy and Berkes 1997). Aside from a simple desire to maintain political power, government managers may have well-intentioned concerns over the apparent lack of knowledge and management know-how on the part of the fishers, and whether fishers can organize themselves for long-term management and sustainability (Pomeroy and Berkes 1997). Ironically, in order for fishers' to effectively manage their fisheries, they must be able to have some control over the resource in question.

If fisheries co-management is to be effective, governments have to begin by recognising the right of local fishers to organise. Recognising this right is the first in a series of governmental actions that is required to facilitate co-management arrangements, with the ultimate government role being "...to provide enabling legislation to authorize and legitimize the right to organize and to make and enforce institutional arrangements at the local level" (Pomeroy and Berkes 1997:467). This must be done in combination with the provision of assistance and supportive services (administrative, technical and financial) to local organisations and institutions. However, enacting these institutional changes is a difficult challenge, and requires significant investments of resources and expertise. In addition, legislation affecting co-management is usually part of a larger, multi-level policy network with many linked laws and administrative procedures. Accordingly, policies supportive of co-management may require completely new or modified fisheries policies, and the modification of overarching administrative and institutional structures. As such, it is clear that

> "Unless governments and decision-makers who implement government policies can be convinced of the desire and the ability of users to manage themselves, not much progress can be made in co-management (Pomeroy and Berkes 1997:467)."

It is therefore important to understand the conditions under which Governments initiate or support these processes of decentralization to support co-management. Pomeroy and Berkes (1997) suggest the development of co-management arrangements in small-scale

fisheries is usually triggered by a problem or issue. In many cases, governments have initiated co-management agreements in response to a management crisis and, sometimes, opportunities. These events and the subsequent reaction at different institutional levels are also key to understanding the impetus for small-scale fisheries co-management in developing countries.

2.8. Arapaima fisheries and management

The arapaima, paiche or pirarucú *(Arapaima gigas)* is among the largest freshwater fish species in the world, and can reach up to 3 meters (almost 10 feet) in length and 275 kg (600 lbs) in weight (Bard and Imbiriba 1986). This species belongs to the Order *Osteoglossiform,* which is an ancient group of freshwater Amazonian fish. It is a top-of-the-web predatory fish, and has evolved unique respiratory and reproductive strategies.

Because of the low oxygen environment in many Amazonian systems, Arapaima can use their highly vascularized air bladders as an accessory respiratory organ. As such, they are mixed-breathers and periodically rise to the surface to gulp air. Breathing intervals are directly proportional to body size, and range from 10 to 20 minutes (Fontanele 1948). Arapaima reproduction involves the formation of pairs, nest building, territorial behaviour, and parental care (Isaac et. al., 1993). Parental care includes helping to aerate the water for its offspring, which is a necessity in the oxygen-deficient habitat. Adults have the ability to exude a milky substance from their head containing a pheromone that attracts offspring and keep them in close proximity to the adult. Reproduction is linked to the annual low- and high-water cycles of the river systems it inhabits (Lowe-McConnell 1987). Peak reproductive periods occur after water begins to rise, flooding the surrounding forests and making these areas available for nest building. Growth rates are rapid, with fry reaching 1 meter in length and 10 kg in weight within the first year. This rapid growth rate continues, with an annual doubling of weight, until the fish reaches sexual maturity and begins to reproduce (slightly less than 116 cm). Although growth rates decrease, the Arapaima continues to grow beyond reproductive maturity (Queiroz 1999).

Arapaima harvest in the Amazon has occurred for at least the last 150 years, and is currently consumed by many Amazonian fishing communities (Queiroz 1999). Most of the gear types and harvest practices have remained relatively constant. The most common device used is a harpoon, which is thrust into the fish as it surfaces to breathe. Other techniques includes the *carpel* (Guyana) or *espinhéis* (Brazil), which are fishing lines with one or more hooks baited with dead fish. Gillnets have also become a major feature of the fishery. Arapaima fishing is traditionally organised on an individual or family level, or by small teams of mostly relatives.

A study of Arapaima fisheries in the Solimões region of central Amazon showed that marked seasonality is a characteristic of these fisheries (Queiroz 1999). Peak harvest coincides with low water when the fish are concentrated in lakes and canals, and are thus easy targets for fishers. Harvest begins in nearby lakes, and then progresses to increasingly distant lakes, eventually necessitating fishing expeditions of between 5 to 10 days. Experienced fishers also have the ability to distinguish between several fish surfacing at the same time and to estimate the length and weight of an Arapaima as it surfaces for air (Castello 2004).

The size and amount of catch in these Arapaima fisheries began to decrease in the early 1990s (Queiroz 1999). In 1996, the Amazonas State government declared Arapaima stocks to be in a "critical stage of over exploitation" and established a two-year state-wide ban on the harvest of this species, which continues to present (Viana et al. 2004). The policy did, however, allow for the harvest and sale of the species from managed fisheries. This allowance was targeted by scientists from the Mamirauá Institute for Sustainable Development, a research and sustainable development NGO with management responsibility for the Mamirauá Sustainable Development Reserve in Amazonas State, Brazil.

The Mamirauá Institute proposed a system of managed Arapaima extraction involving a rotation system in 31 of the 80 lakes by four communities in the Reserve's sustainable use zone (Viana et al. 2004). This proposal was accepted by the State Government, and

involved an initial annual quota of 3 tons of Arapaima, based on a previously published estimate of Arapaima production in Peru. A new survey method, based on fisher's knowledge, was subsequently used to monitor Arapaima stocks and determine quotas. The development of the method was based on a study in the area by Castello (2004) which demonstrated that experienced 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 management of the Project initially fell on an Institute scientist and a community coordinator elected by the participating fishers. The communities eventually opted to create a formal Production Association (*Associação de Produtores do Setor Jarauá*) to represent community interests (Viana et al. 2004). This Association eventually took responsibility for most of the administrative and technical duties originally assumed by Institute personnel and community assistants. The Association's administrative members are elected to their positions, and are responsible for determining annual quotas and marketing the harvest. This body organises the surveys, determines the quota, submits the quota for Government approval, distributes quotas to different communities, who then harvest the Arapaima and sell the catch to the Association at established rates (Viana et al. 2004). Criteria for quota distribution were established by the Association's directors to distribute the fish to associates according to their relative contribution to the management activities, including participation in lake patrols, adherence to harvest restrictions (such as minimum sizes and closed seasons) and meeting participation (Viana et al. 2004). Quota distribution is based on numbers of fish, and was determined at between 0 and 3 fish per associate during an open meeting. According to Viana (et al. 2004) this system of quota distribution was "...well received by the associates and is expected to be maintained for the future". The Mamirauá Institute currently plays more of a scientific advisory role in the surveys and the determination of quotas. The Institute also serves as an intermediary between the Association, Government and buyers.

Stock assessments in the management area showed a 300% increase in the number of Arapaima between 1999 and 2001. Socio-economic data showed that the average family incomes in the participating communities increased from around R$ 1.90 in 1995, to R$ 2.70 in 1998/1999 and to R$ 4.10 in 2000. Several communities in other areas of the Reserve and the nearby Amanã Sustainable Development Reserve have requested technical assistance to develop similar programs (Viana et al. 2004).

Aside from establishing the accuracy of fishers' counts, Castello (2004) has demonstrated that other fishers can be trained by experienced fishers to count Arapaima. This led to the survey method being taught to fishers from other areas of the Amazon basin such as the Santarém region in the Brazilian state of Pará, the Pacaya-Samiria National Reserve in Peru, and Guyana. The Mamirauá project was also used as a model in the development of a community-based Arapaima management project in the North Rupununi floodplains of Central Guyana. This thesis is based on research focused on the North Rupununi Arapaima project.

2.9. Literature summary

Community-based conservation, as a means of achieving integrated conservation and development, has emerged as the dominant paradigm. One important benefit of community involvement is the inclusion of local institutions in resource management. Local institutions, which encompass local knowledge and management practices, are of particular relevance since much of the biodiversity to be conserved are under open access or common property ownership regimes. Conservation of biodiversity should thus involve a participatory approach to community development that builds on existing local institutions with a history of success. Although community-based conservation has been heralded as the only realistic option, many of these initiatives have failed to effectively integrate conservation and development.

One approach to understanding facilitators and barriers of community-based conservation is by examining the histories of individual projects. Complex systems theory is a useful approach to understanding the complexities of community-based conservation. This

theory highlights the importance of self-organisation, and interactions across different levels of organisation, in shaping complex systems. Self-organisation in specific project histories can be seen as the process of problem identification and action mobilization at the community level. These processes can be driven by individuals or larger community-level movements, and may be influenced by both internal and external forces. Another aspect of complex systems is that they exist at a number of different scales in both time and space. Examining institutional interactions across different levels of organisation is important in identifying cross-scale arrangements that foster or impede community-based conservation. Cross-scale institutional interactions in community-based conservation projects are often structured by co-management arrangements.

Co-management has been widely advocated in small-scale fisheries management; however, the reluctance of government authorities to share management power and authority remains a major obstacle. It is therefore important to understand the conditions under which Governments initiate or support these processes of decentralization.

Arapaima management in the Mamirauá Sustainable Development Reserve was structured under a co-management arrangement. This Brazilian initiative served as a model for the development of the North Rupununi Arapaima Management Project, which is the subject of this case-study. The following analysis will thus focus on an examination of the Project history, using self-organisation and cross-scale institutional interaction as a guides.

Chapter 3

"Plenty gaffing": Research methods

Community meeting in Rewa Village

3.1. Introduction

In this chapter, I investigate the study's methodological approach and its inevitable limitations. I first outline my philosophical and theoretical approach with a discussion of the qualitative paradigm. This is followed by a description of the Rapid Rural Appraisal approach and the general research methods used. The chapter then follows with a description of the methodological aspects of my fieldwork, including: research preparations; data collection in the communities; research activities with Government agencies and NGOs; and verification exercises. I conclude by reflecting on the study's challenges and limitations, along with a brief summary of lessons learned.

3.2. Philosophical and theoretical approach

The study approach falls primarily within the category of qualitative research. Creswell (1994) suggests that the qualitative approach to research attempts to understand meaning in a particular social problem or issue by using the views of informants to construct a general picture of social interaction in a natural setting. There are a number of assumptions involved in qualitative research (Creswell 1994), including:

- Qualitative research places emphasis on process, rather than just outcomes.
- Interest is in understanding and meaning, e.g., how people make sense of their lives, experiences, and their structures of the world.
- The researcher is the primary instrument in data collection and analysis.
- It involves fieldwork where the researcher observes conditions and behaviours in their natural setting.
- Qualitative research is descriptive, where meaning and understanding are gained through words and other visual sources.
- Qualitative research involves an inductive process where conclusions, concepts and hypotheses are built from details.

This approach to research thus involves the purposeful selection of participants, documents or visual materials that will best satisfy the objectives of the research (Creswell 1994). Miles and Huberman (cited in Creswell 1994) suggests that when conducting qualitative studies, researchers should also consider additional parameters,

such as: the **setting** - where the research will take place; the **actors** - who will be interviewed or observed; the **events** - what the actors will be observed doing or interviewed about; the **process** – the evolving nature of events undertaken by the actors within the setting. The study's methodological approach thus attempted to address these parameters during the various phases of research.

3.3. Research techniques: Participatory and Rapid Rural Appraisal

The methods used in the field research were participatory and focussed primarily on qualitative data collection. According to Mitchell (2002: 218), the primary assumption underlying participatory approaches is that "local people are knowledgeable about matters which affect their lives." It is therefore legitimate to assume that insights into the self-organisation and cross-scale linkages are best provided by the persons involved in the Project being studied. In an attempt to document these insights, within the study's cost and time constraints, methods were drawn from Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA).

Rapid Rural Appraisal was developed as a means of gaining "...information and insights from local people and about local conditions, and do so in a cost-effective and timely manner" (Chambers 1994:253). RRA allows for the "...rapid collection of information by focusing on selected key variables..." (Mitchell 2002: 214). PRA takes this approach further, by encouraging local people not only to give information, but also to participate in defining research priorities, methods, and how the information will be used (Pido et al. 1996). Since the core objectives of the research were preset, the study drew primarily from the RRA approach. However, the research attempted to embody the principles of PRA by accommodating local requests. In the end, the study's methods burrowed from both RRA and PRA toolboxes, and included participant observation; semi-structured interviews; informal discussions; and a focus group session that involved timeline analysis and institutional diagramming (Chambers 1992, 1994; Pido et al. 1996) (Table 3.1). These techniques were iterative, and allowed for some adjustment of the research questions in order to accommodate community research interests.

Table 3.1 – Summary of research methods.

Methods	Purpose	Number of participants
Semi-structured interviews	Allowed researcher to explore specific insights and information in detail. Based on a schedule of questions (Appendix 1) designed to probe the self-organisational and cross-scale aspects of the initiatives.	44 total respondents 39 Community respondents 3 Government respondents 2 NGO Respondents
Informal interviews	Used throughout the fieldwork to gather information and enrich data emerging from semi-structured interviews. Based mostly on questions outlined in interview guides (Appendix 1). Critical in better understanding local realities of the project, identifying potential interviewees, and refining interview questions.	
Participant observation	Used to increase understanding of inter-organisational and community linkages and aid in tailoring questions to local conditions.	———
Focus groups	Used to verify and enrich information emerging from interviews. Used to conduct good/bad analysis, livelihood and project timelines (with focus on self-organisation), and institutional mapping (with focus on cross- scale linkages). Participants were primarily members of Fisheries Committees, along with Tushaus and fishers.	1 session 27 participants Representing 11 communities

These techniques were used to probe a number of questions related to the research objectives, including:

i. **Self-organisation**: What precipitated the Project? How was the Project funded and organized? What was the role of leadership in the evolution of the Project? What learning processes did the Project go through? How was capacity developed? Was their adaptive learning and management or learning networks?

ii. **Cross-scale linkages**: How is the Project connected to the various levels of government, NGOs, and development agencies through cross-scale linkages? What were the roles of horizontal (across space) and vertical (across levels of organisation) institutional linkages? What cross-scale linkages facilitated, or hindered, the local-level organisation?

iii. What tools/interventions can be used by NGOs and community organisations to increase governmental support for the strengthening of local-level institutions?

3.4. Getting ready to go

3.4.1. Selecting the case-study and scope

The Project researched was selected from a list of over four-hundred nominations for the 2002 UNDP Equator Prize. The Equator Prize falls under a larger effort known as the Equator Initiative, which recognises "successful" integrated conservation and development initiatives in the equatorial belt. Through the Equator Initiative, funding was also available for case-study research on Equator Prize finalists, with the goal of identifying lessons-learned from these "successful" projects.

Initially, the study was to focus on the North Rupununi District Development Board's (hereafter NRDDB) initiatives in Central Guyana. Although included in a short-list of a hundred and fifty initiatives for consideration, the initiative was not selected among the twenty-seven finalists. However, I was familiar with the NRDDB and its work, and maintained a number of contacts with access to the organisation. After discussions with

Dr. Berkes and funding contacts, we decided that the NRDDB and I would be a good fit, and that the initiative would be the focus of my research.

However, after further discussions with Dr. Berkes and Project personnel in Guyana, we concluded that the NRDDB as a whole was a large and multifaceted initiative, and would require extensive research beyond the available time and financial constraints. Upon the suggestions of Project personnel in Guyana, we decided to further refine the study's focus, and conduct a case-study of the NRDDB's thirteen (13) community Arapaima Management Project. The Project was particularly suited to the study's focus since it fit the criteria (on paper) of a community-based conservation initiative, it led to the development of local level management institutions, it involved a number of actors at different levels, and had emerged from a long history of traditional management in the area. The Project's focus on endanger species management also suited my training and background as a biologist (see Chap. 4, Sec. 4.6 for detailed description of Project).

3.4.2. Reading, reading, reading

A seminar series was also conducted at the Natural Resource Institute of the University of Manitoba, in the months prior to my departure to the field. These sessions focused on topics related to community-based conservation and research, and were led by a number of University Professors and researchers. The seminar series also involved an initial review of relevant literature, and was a joint effort between a number of Masters and PhD candidates at the NRI. The review was intended to provide a framework for analysing community-based conservation projects, and covered topics such as: community-based management; common property theory; sustainable livelihoods; political ecology; traditional ecological knowledge; systems view; resilience; and cross-scale analysis. The resulting reading list formed the basis for the literature review presented in Chapter 2.

All available data regarding the target Project and communities were reviewed both prior to, and during my time in the field. Archival research was also conducted to examine changes in fisheries legislation, historical Arapaima use, and changes in traditional resource use practices. This archival review took place in the city, primarily at the

Iwokrama Centre and Ministerial Offices. I paid particular attention to documents specific to the Project including: proposals and reports on Project outreach; community meetings; the survey training programmes; Arapaima surveys; and visits to the Mamirauá Project in Brazil. Additional reports on linked Iwokrama programmes and Arapaima management in Brazil were also key in gathering background information on the Project.

The primary resource used in refining the research questions was the Arapaima Management Plan. This document described the proposed institutional structure and implementation of the Project. It also provided a brief timeline of the primary events leading to the Project's development, which offered information into the self-organisational and institutional aspects of the Project. Additional literature on Arapaima ecology; similar Arapaima projects in Brazil; the NRDDB and its partner organisation, the Iwokrama Centre; and prior studies in the communities were also reviewed.

3.5. Flip-flops and mosquitoes – My time in the communities

3.5.1. Getting acquainted with the land and people

My research officially began on July 4, 2003 when I attended the NRDDB's Board meeting at the Bina Hill Institute in Annai District. I was allowed to introduce my proposed research at the meeting, and spent the following days identifying key informants and discussing the study's focus and objectives. The Executive Fisheries Committee (EFC) of the NRDDB, in particular the EFC Chairman, was identified as my primary research counterpart. Upon requests from the EFC, the study was structured to provide a critical assessment of the Arapaima Project. It was also apparent from these early discussions that Project activity at the community level was not substantial enough to focus the case-study on one community. As a result, I decided to attempt data collection in as many of the thirteen (13) communities involved in the Project as possible. I felt that this approach would best capture the regional aspect of the Project.

Following my initial discussions with NRDDB members, it was also decided that the Bina Hill Institute would act as my home for the remainder of the research period. Aside from being the NRDDB's base of operations, it also functioned as a regional

communications hub, housing a short-wave radio and the community radio station. The location of the Institute also proved ideal, since it lay a short distance from the area's major road, with six communities easily accessible by walking or bicycle. Living at Bina Hill also afforded me the chance to participate in programme hosting and development at Radio Paiwomak, the community radio station. With help from the Radio Administrator, Ellen Davis, I was able to participate in an on-air interview about my research. Since many residents are bi-lingual, with Makushi being their first language, the questions and answers were rehearsed and broadcasted in Makushi.

3.5.2. Collecting data

- Selecting respondents

Early discussions with key informants and community members revealed that Project activity at the community level was low. It was therefore challenging to identify a target group, since detailed knowledge of the Project seemed to be concentrated to a few individuals. In the end I targeted key informants belonging to two primary groups for semi-structured interviews. These included members of the Executive and Community Fisheries Committees (EFC and CFC), and former Arapaima fishers and traders (see Chap. 4, Sect. 4.7 for detailed description of Fisheries Committees). Former Arapaima fishers were defined as fishers who actively pursued commercial Arapaima harvest for more than two consecutive years. Arapaima traders were identified as individuals formerly involved in the buying and selling of Arapaima harvested from the North Rupununi area. Potential respondents were identified from Project documents and through referrals from key community members. Special effort was made to target the groups separately, but early in the interview phase it became apparent that in many communities, most of the Committee members were also former Arapaima fishers. As a result, there was significant overlap in the questions used to interview the two groups. Additional interviews were conducted with village elders, leaders and local fishers in an effort to document additional community perspectives on the Project. These individuals were identified through informal discussions and referral from other community members. Questions used in these interviews were drawn from those used for the two major respondent groups, with varying emphasis on local involvement, Arapaima harvest

history and ban, and perceptions of village level committees and institutions (see Appendix 1 for question guide).

- Interviewing respondents

My first two weeks in the field were spent accompanying members of the EFC on river patrols and outreach visits to three river settlements. Aside from observing the meetings I also had a number of informal discussions with former Arapaima fishers and members of the Communities' Fisheries Committees (CFCs). From these experiences, a semi-structured interview guide was developed (Appendix 1) with input from the EFC Chairman. This was done in order to generate questions that were relevant at the community level, and that targeted respondents' knowledge of Arapaima harvest and the Project.

A total of thirty-nine (39) semi-structured interviews were then carried out in ten (10) communities. This included eighteen (18) out of a listed forty-five (45) Community Fisheries Committee members in ten (10) communities. Twenty-one (21), of an estimated two hundred (200) former Arapaima fishers in the region were also interviewed (Table 3.2). Particular emphasis was placed on interviewing former Arapaima fishers from the communities of Apoteri, Rewa, and Annai, since these communities served as the primary harvest bases in the Region. In most communities, two (2) or three (3) interviews were often enough to obtain significant repetition in responses, particularly information pertaining to Arapaima harvest, project history and function of community level institutions. Significant repetition in responses was also observed among respondents from different communities. A typical interview session lasted from two (2) to two and a half (2.5) hours. In many cases I was invited to homes and gatherings where further informal discussions and observations occurred.

3.5.3. A lot of gaffing: informal interviews and discussions

Informal interviews and discussions contributed significantly to my data collection throughout the research process. Many of the formal semi-structured interviews eventually led to informal follow-up discussions at different times during the research.

Table 3.2 – Number and description of community interview respondents

Community	Respondent breakdown							Total Interviewed	CCs Interviewed	Total CCs in Community
	Respondent 1	Resp. 2	Resp. 3	Resp. 4	Resp. 5	Resp. 6	Resp. 7			
Apoteri*	CC, EC	CC, AF	CC, AF	AF	AF	AF	T	7	3	5
Aranaputa	CC, AF	AT	--	--	--	--	--	2	1	2
Annai	CC, AF	CC, EC	AF	AT, AF	AT	--	--	5	2	2
Crash Water*	CC, AF	--	--	--	--	--	--	1	1	3
Fairview	CC, AF	T	--	--	--	--	--	2	1	4
Kwataman*	CC, AF	CC	EL, F	EL, F	F	--	--	5	2	8
Rewa*	CC, AF	AF, T	AF	AF	--	--	--	4	1	4
Surama	CC, AF	CC	CC	AF, EL	AF, EL	F	--	6	3	7
Toka	AT, EC, T	AF, EC	AF, CC	--	--	--	--	3	1	7
Wowetta	T, CC, EC	CC, AF	CC	F	--	--	--	4	3	3
Total								39	18	45

* Communities in which I observed EFC outreach meetings

KEY	
CC	Community Fisheries Committee member
EC	Executive Fisheries Committee member
AF	Former Arapaima Fisher
AT	Former Arapaima Trader
T	Tushau
F	Fisher
EL	Elder

These discussions were also key in quickly verifying new information and trends as they emerged. As such, the occurrence and scope of these informal discussions went well beyond that of the formal interviews, and served as a rich source of data and information. These discussions were often based loosely on the formal interview questions, and the resulting information was frequently recorded in my notes.

3.5.4. Getting together: focus-group sessions; timelines and institutional mapping

Early in the discussions with the NRDDB, it was suggested that attempting a focus group session, particularly on a regional scale, would be particularly difficult. However, one of the needs subsequently identified by the CFC Chairman was funding for a meeting of the region's fisheries committees. I therefore arranged to fund and organise this meeting, with the understanding that I would be allowed to conduct a session with the attending fishers.

The meeting was attended by twenty-one (21) participants from eleven (11) communities. Participants were varied, and included members of Community Fisheries Committees and the Executive Fisheries Committee, village leaders, fishers and other community members. Many of these individuals had been involved in either semi-structured interviews, informal discussions, or both, prior to the meeting. I used the session to conduct three different focus-group activities, including a good/bad analysis; a timeline exercise; and an institutional mapping activity. During the good/bad analysis, I asked each attendee to suggest the good, and the "not so good" aspects about the Project. In order to increase the openness of the participants, I also offered the option of anonymous, written suggestions. Most participants opted to verbally participate. The timeline activity was used to identify major events, and their approximate dates, in the history of Arapaima harvesting in the area. This exercise was then continued to establish and verify the Project timeline and history. Finally, the participants were asked to identify key persons, groups and organisations involved in the Project; and describe their role and history of involvement. Participant responses were recoded on a flip chart and verified throughout the group session.

3.5.5. Participant observation

Participant observation was key to much of the study's data gathering exercises. Being based at Bina Hill Institute, I was able to observe and participate in a number of meetings and workshops relating to the NRDDB, its sub-projects, and the Iwokrama Centre. Attention was paid particularly to how meetings were conducted including: what was said; who ran the meeting; who was allowed to speak; and how those in power reacted to questions or criticism.

I also participated in a number of non-research activities during my visits to communities including: fishing; farming; village council and NRDDB outreach meetings; and patrols of the management area. During these visits and activities I was particularly watchful for the presence and functioning of Project activities and institutions at the community level. This was furthered enriched by daily discussions with individuals from all over the region passing through, or based at, the Institute. The Institute's central location further allowed me to visit the nearby communities on a daily basis and participate in sports; cultural; and religious activities.

3.5.6. Community guides and research partner

Early in the study a local research partner, suggested by the EFC, was identified and involved in planning and conducting interviews. However, it became apparent during the course of these early interviews that respondents were uncomfortable discussing certain issues in the presence of another local resident, particularly from a different community. I subsequently attempted interviews on my own, or with guides from each of the communities visited, and was much more successful at gathering information.

A community researcher was again recruited prior to beginning my research activities with Government and NGO personnel. This individual was drawn from the NRDDB's youth leadership programme upon the programme's administrator recommendation. I felt that being involved in this exercise would give the individual rare access to high levels of Government and would be an important networking and capacity building exercise. This individual travelled with me to the capital city of Georgetown, and was involved in

developing interview questions and conducting interviews with Government personnel from the Ministries of Amerindian Affairs; and Fisheries Crops and Livestock.

3.6. Pavement and Potholes – My time in the city

3.6.1. Collecting data at the Iwokrama Centre

The Iwokrama Centre served as the base for my research activities in the capital, Georgetown. I had previously worked with the Centre on a number of projects and was thus familiar with the organisation and many of its personnel. Discussions with these individuals prior to my trip into the communities were used to plan the research process and logistics. Iwokrama personnel were also integral to gaining a better understanding of community conditions, the Project history, linked institutions and key partner organisations.

Giving and receiving feedback and information with the Centre's personnel was on-going throughout the research process. In many cases, specific information and trends emerging from my stays in the communities were discussed and verified with Centre personnel. Many of these discussions offered insights and responses relating to the primary research and interview questions. Because of this constant information flow, I eventually chose to conduct formal semi-structured interviews with the Centre's acting Director General and former Senior Wildlife Biologist; and the Centre's former Social Scientist.

3.6.2. Interviews with Governmental representatives

My first exposure to Ministerial processes was my experience in applying to the Environmental Protection Agency and the Ministry of Amerindian Affairs for research permits. The complexity and time involved in these processes initially stalled the research schedule for approximately a month. However, sympathetic individuals in these agencies were eventually able to speed up the processes, allowing me to officially begin research activities in July, 2003.

Following my stay in the communities, attempts were made to interview specific individuals in the Government Ministries sighted as overseeing the implementation of the

Arapaima Project and Plan. A total of four (4) interviews were eventually conducted with this group, three (3) with representatives from the Ministry of Fisheries, Crops and Livestock, and one with the Minster of Amerindian Affairs. Attempts were made to arrange meetings with the Minister of Fisheries and representatives from the Ministry of Development and Local Governance, but these individuals kept declining due to scheduling conflicts.

The Fisheries personnel interviewed included the Fisheries Officer assigned to the Project, and two Senior Fisheries Officers responsible for Inland Fisheries and Aquaculture, and Coastal Fisheries, respectively. The Senior Officer responsible for Aquaculture was the primary governmental representative involved in the development of the Project and Management Plan (see Appendix 1 for question guides). The total research period ran from July 1 to November 2, 2003.

3.7. Trying to get it right - Verifying data

Data verification was an ongoing process throughout the course of the study. In all of the semi-structured interviews, further questioning and discussions were used whenever I felt unsure about a particular response or observation. General information trends emerging from the interviews were also discussed with key Project personnel, both community and NGO, throughout the study. These trends were also examined and verified during the focus group meeting, where participant responses were recorded on a flip chart and verified throughout the meeting, and in a wrap-up session. At the end of my stay in the communities, I conducted informal discussions with EFC members on the general research findings and their potential implications on the Project. Following my return to Canada, additional input and verification was acquired through discussions and correspondence with Iwokrama personnel and the Brazilian scientist involved in the development of the Project.

Feedback from these various sources was used in the preparation and verification of three primary research documents: a draft Technical Report based on the study; a summary evaluation of Project components; and a "plain-language" summary of lessons-learned.

On October 8, 2004, I returned to the Bina Hill Institute for another NRDDB board meeting. The Board and EFC members were presented with a research poster, two copies of a draft Technical Report and the associated summaries. During the meeting I presented the poster and was given general feedback on a number of the research findings and the potential for restructuring the Project. This was followed by two days of meeting with individual EFC members to discuss the lessons-learned and Project evaluation documents. Their input was subsequently incorporated into the draft Technical Report. Potential modifications to the Project Plan and approach were also discussed. Following these exercises, the EFC members voiced their support for the Draft report and associated documents.

3.8. Research challenges and limitations

3.8.1. Scale

Choosing to attempt a multi community study proved to be one of the biggest challenges in conducting the research. Aside from the geographical scale and travelling involved, gathering data in so many communities also reduced the depth to which I was able to probe community specific issues and conditions. In terms of geographical scale alone, the spread of the communities amounted to approximately 8,000 square kilometres of water, savannah, and rainforest. Many of the communities were only accessible by a half days travel by trail or boat, which exposed the study to significant transportation and logistic challenges. Where possible, communication was attempted via short-wave radio. This however was often restricted to third party message relays and proved unreliable for Research purposes. As a result, I spent a significant amount of time arranging transportation, waiting and travelling. In some instances, transportation constraints meant I was only able to spend a few days in the more remote villages and, in the end, prevented me from visiting all thirteen communities. That said, I did have the chance to have discussions with community members from these villages visiting the Bina Hill Institute, and was able to get a sense of the state of the fisheries committees in these communities.

3.8.2. Sample size and validity

My findings and conclusions are based on the aforementioned data collection methods and the opinions and perspectives of the individuals who participated in the study. As such, my community related findings and conclusions are based primarily on the information collected in ten (10) of the thirteen (13) Project communities. Although the targeted respondent group in the communities was relatively small, time and logistical constraints meant that only a representative portion of the group was formally interviewed. Recognising my constraints, I made a special effort to focus on individuals in each community that, in addition to having a good understanding of the Project and Arapaima harvest, also had a good grasp of community dynamics and conditions. Reponses in the semi-structured interviews often became repetitious after two or three interviews in a community, suggesting that there was a fair amount of validity to the information collected. Personal observations and informal discussions were also used as much as possible to verify and enrich the more formal data collection activities.

3.8.3. Mobile and dispersed target group

Again, because of the size of the research area and the scattered layout of most settlements, finding and visiting potential interviewees was very challenging. In many cases a three-mile walk to arrange an interview would lead to an empty house and significant sunburn. Even after agreeing to interview times, some residents were found inebriated, absent, or attending to other matters. Potential respondents were often involved in farming or hunting trips and lived outside of their communities for extended periods of time. Others had moved out of the community, or were pursuing seasonal employment in Georgetown or Brazil.

3.8.4. Primarily dormant livelihood and Project

Arapaima fishing is not currently practiced (visibly) in any of the Project communities. It was therefore impossible to observe harvesting in progress. Instead, I had to rely solely on literature and respondents' accounts to understanding the livelihood's dimensions. In addition, many of the fishers interviewed were visibly uncomfortable, at least initially, in discussing their past involvement in Arapaima harvest. This was possible due to the fish's

"banned" status and, in some cases, a fear of reprisal for past involvement in the illegal harvest. Many inevitably attempted to downplay their past involvement in the harvest. Most eventually opened up and offered more information after I reassured them of their anonymity in the study's findings and my indifference to past harvesting (whether illegal or not). However, it is possible that some respondents still withheld information.

During the research period, the Project did not involve a very activate community dimension. Aside from a two week EFC patrol and outreach exercise early in the study, and the meetings I facilitated, there was no Project related activities during my time in the communities. As such it was not possible to observe the work of the community level institutions while in the field. The annual Arapaima survey was schedule to take place during the latter part of the research period, but was delayed due to funding difficulties. I assisted in the preparation of funding proposals for the survey and contributed a portion of my research funding to the effort. The survey eventually took place after I had returned to Canada.

3.8.5. Community and researcher perceptions

During my stay in the community I was known as "the Guyanese white boy". Although I had experience working in the area, spoke the local English dialect and was a Guyanese national, it seems clear that I was perceived as an outsider "from town." This inherent difference in "positionality" no doubt affected how I perceived, and was perceived by, the community.

Although I never conducted research in the communities on behalf of Iwokrama Centre, my past affiliations with the organisation was known to some interviewees. It is hard to say how much my status as an outsider, and my perceived affiliation with Iwokrama, may have affected the information emerging from my research in the communities. However, I did make an effort to distance myself from the Organisation during my interactions with community members, and reiterated my commitment to anonymity in requesting interviews or information. As the study progressed, I also participated in the hosting of programmes on the local radio station, and became known in some communities, even

prior to travelling there, as "Deejay Damian". This eventually became my official local designation, and interviewees seemed more receptive and open during interviews and discussions.

On the flipside, the question "To what extent did my time with Iwokrama Centre affect my perceptions of the Project and communities?" can also be asked. This is particularly relevant since this Centre's involvement in the Project was also being researched. Throughout the research period, I kept in mind that my previous experience may affect the way I interpret and analyse the data. I thus made a concerted effort to maintain my objectivity, not taking anything for granted. I made my own judgments on the information I collected, and tried my best to verify findings through discussions with key informants from both the communities and Iwokrama.

3.8.6. Data analysis

Most of the data analysis occurred in Winnipeg. Data was analysed using Microsoft Excel and Microsoft Word. These Programmes were used to prepare spreadsheets and tables, where column headings were questions, or question themes, and row headings were individual respondents. The matrix was then filled with individual responses to specific questions or question themes. This allowed for the emergence of data trends, which formed the basis for the study's findings and discussion. Analysing data away from the data source also meant that information gaps emerging from the analysis could not be immediately addressed. That said, I was able to fill some of these gaps though correspondence with project personnel in Georgetown.

3.9. Lessons learned

The biggest lesson-learned during the research process is how difficult planning and conducting qualitative, people centred research could be. Prior to the study, planning this type of research was outside my existing experience, and ultimately required one of the steepest learning curves of my academic life. Looking back on my time in the communities there are a number of, in keeping with the study's goal, "lessons-learned" that come to mind.

Firstly, I feel that integrating a quantitative aspect into the research would have enriched the study's findings (e.g., statistically significant sample of community's awareness and perceptions of the project). Including a quantitative aspect to people-centred research has its pros and cons, and imposes additional requirements on the research approach (as does qualitative approaches). Although taking an integrated quantitative-qualitative approach to research is obviously more work, which is often the last thing students and researchers want, it can be well worth the time and effort.

Preparation is also something I would like to stress. I think I was a little hasty in leaving for the field, and was the victim of an "I'll figure it out when I get there" attitude. Every opportunity should be made to take pause, and figure out what it is you are attempting and the best way of achieving it. I would also suggest pursuing courses in Project Management and research methodologies as key steps in preparation for the field. Although flexibility in the field is extremely important researcher characteristics, effective preparation can only increase a researcher's ability to adapt to field conditions and challenges.

Early in the research I found it somewhat difficult to approach total strangers and ask them to take the time to answer my questions, particularly since they were not involved in defining the study's objectives. I was very sensitive to negative body language, and did not press for an alternate interview time if an individual appeared particularly uncomfortable or said they were not available. Luckily, the people of the North Rupununi were much more patient with me, and I hardly ever was refused an interview. Getting to interviewees was another matter entirely.

As I gained experience and confidence, I was able to recognise that certain individuals avoided interviews at all costs, irrespective of time spent in the community, or reassurances about the research. In these cases a little extra effort and encouragement from the researcher may be required. You need to be as persistent as they are evasive, and figure out the reason for their discomfort. This might seem obvious, but it was in complete opposition to my instinctual reaction in such circumstances.

Chapter 4

The rise and fall of institutions: The history of Arapaima harvest and linked institutions in the North Rupununi

Transporting Cassava sticks (*Manihot esculenta*)

4.1. Introduction

This chapter is grounded in the argument that community-based conservation can only be understood by examining the histories of projects where community-based management has been planned and implemented (Brosius et al. 1998). I build on this argument by examining the history of resource management in the North Rupununi, paying particular attention to the institutions related to Arapaima management in the region.

The chapter begins with an overview of the Makushi people and the role of wildlife in the local culture. This is followed by an examination of Arapaima harvest taboos in Makushi culture, and its role in the historical conservation of the species. The next section discusses the events leading to the breakdown of these traditional restrictions, and the emergence of a local Arapaima fishery. The discussion then turns to the development of the Iwokrama International Centre, the subsequent creation of the NRDDB, and the re-emergence of Arapaima management institutions in the North Rupununi. This is followed by a detailed examination of the Arapaima Management Project's development. The chapter concludes with a brief analysis of the Project's performance to date.

4.2. The Makushi of the North Rupununi

The North Rupununi savannahs and nearby forested regions are the traditional home of the Makushi. Compared to other indigenous Amazonian societies, traditional Makushi culture 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 (Allan 2002). 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 politically decentralized.

However, local leaders, or *Touchaus,* were 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. There is also some local commercial exploitation of wildlife for the meat and pet trades. Wildlife represents a major local food source in the North Rupununi. Mammals and fish in particular provide the majority of the protein intake for villagers (Watkins et al, 1999). According to a study by the Makushi Research Unit (MRU 1999) over 100 species of fish are eaten by Makushi. As such, fishing is an extremely important subsistence activity.

Aside from subsistence and economic value, wildlife also play a fundamental role in Makushi culture. For instance, some animals are not eaten by pregnant or lactating Makushi women, or by men preparing for specific tasks (MRU 1999). Historically, there were also restrictions placed on hunting animals, where several fish and mammals species were never used as food. Arapaima, or *warapai* in Makushi, was one such taboo species, and there are a number of local myths and stories related to the species.

Unfortunately, the biodiversity upon which the Makushi depend is under threat from both internal and external forces. The Makushi were introduced to cash economies primarily in the 1800s, through the balata (rubber-like resin) and cattle ranching industries (Watkins et al. 1999, Allan 2002) (See Appendix 2). Between the 1960s and 1970s, the trade in wild caught animals and animal products also became a significant income generating activity in the region. This trade led to the harvesting of Arapaima, Giant River Turtles (*Podocnemis expansa*), Giant Otters (*Pteronura brasiliensis*) and Black Caiman (*Melanosuchus niger*) for sale in Brazilian markets (Watkins et al. 1999). These industries, and in many cases the stocks on which they are based, have declined significantly in the past 30 years (MRU 1999). As a result, local economies have become stagnant, with very few opportunities for employment and income generating in the region.

Exposure to economic forces, in addition to cultural change and acculturation, has led to the breakdown of many traditional management institutions and activities. Local residents are therefore often driven to non-sustainable extractive activities including the over harvest of wildlife for external markets (Watkins et al. 1999). In the end, the loss of traditional systems, the shift from subsistence, and the decline in economic opportunities, has left the Makushi people with a desire to recreate a cash economy without the tools to do so (Forte and Pierre 1994).

4.3. Demons and scales: The Arapaima taboo

The Makushi in the North Rupununi region of Guyana once ascribed to a number of myths and beliefs, many of which centred on the Arapaima. These beliefs formed the basis of a complete taboo on Arapaima harvest in traditional Makushi culture. However, some villagers also spoke of a time *"...long before now"*, when Arapaima was consumed by the Makushi. They suggest that the taboo was a reaction to a time when villagers could not consume an entire Arapaima (salting was not available), resulting in the "*wasting*" of the meat. In response to this wasting, the local *Piaiman* (shaman) was said to have created stories of *"bad things happening to you if you eat the Arapaima"* as a deterrent. Although no longer practised in current Makushi culture, this taboo persisted well into the 20th century. As a result, there is still a significant living memory of the beliefs surrounding the fish within North Rupununi communities.

During the course of the study, five traditional stories relating to the Arapaima were recorded (Boxes 4.3 – 4.7). Most, of these stories and beliefs seem to have been based on the behavioural and/or physical appearance of the fish. Fish taboos stemming from behaviour and appearance have also been documented among fishing communities of the Amazon and Atlantic forests in Brazil (Begossi 1992; Begossi et al. 2004).

Box 4.3 - "Oma"

"Oma is like a devil or demon. Long ago people used to say that if you eat Arapaima, the Arapaima used to burst the person when it raise to breathe. When Arapaima raise to breathe in the river we used to say it bursting."

In almost every village visited, there were stories told of Arapaima once being considered to be '*Oma*', which has a similar meaning to demon or evil spirit in Makusi. It was explained that being an obligatory air breather, the Arapaima surfaces for air every fifteen to twenty minutes. The act of surfacing creates a noise most villagers refer to as 'bursting'. Many believed that if an Arapaima was eaten, it would eventually 'burst' inside of the person who ate it, killing them. Many persons referred to this myth as "long-time story', and said that hardly anyone believed it anymore. According to one self-described 'amateur *Piaiman*' (Shaman), *"...anything that make a loud noise that people can't explain, they used to call it Oma"*. Even older villagers, who claimed to have believed this story as children, dismiss it as '*stupidness*', calling Arapaima one of the "*sweetest*" fish. Stories about bursting were the most common associated with the Arapaima, and were told in every community visited.

Box 4.4 - 'Mother and father of the fishes'

"The people say that he is the father and mother of them, because he is the biggest fish. When Arapaima used to be normal, we used to have a lot of fish, big fish, now that Arapaima not around, fish don't have mother or father. If Arapaima, come back, we could get other fish"

Aside from bursting stories, some older community members also referred to the Arapaima as being "the mother and father of the other fishes". Other stories spoke of the larger individuals being the mother of the other fishes, or specifically the mother of the rest of the Arapaima population. In all cases, killing Arapaima, or the large individuals in particular, would negatively affect the remaining Arapaima population, or all other fish species in general.

Box 4.5 - Sores, scales and electrocution

"Most Amerindians believed that if you caught the Arapaima and ate it that you would get sores. When you died, your skin would get scaly and fall off just like the skin of the Arapaima falls off when dried. The two stones in the head (otolith) if eaten would cause problems with your head and brain and you would get shocked when thunder rolls."

This story was told by both respondents from one community. Like that of the "Oma" stories, these beliefs described the consequence of defying the taboo, and served as a very effective enforcement mechanism. One of the respondents who told the story, and who has long been involved in Iwokrama-NRDDB Programmes associated the story with local management institutions. According to him, these stories acted as "*Sort of an old management systems created by villages to prevent people from catching these big fishes, because only part would be eaten [and much of it wasted]. So the Piaiman developed these stories to make people not catch the Arapaima."*

Box 4.6 - Milk and kinship

"They say because the Arapaima is give out milk, how it nursing it young. They say how it like a animal [mammal], like a human being, so you can't kill it"

A number of fish species that produce milky substances, such as epidermal mucus, were also highly taboo in traditional Makushi culture. The Arapaima falls into this category because of it secretes a milky substance with a pheromone that apparently causes the fry to aggregate and remain close to the parent. Many villagers therefore believe that the Arapaima is actually suckling its young, making it "like people". As Arapaima began to be consumed regularly in the area, and was no longer an absolute taboo, restrictions on its use by young children and pregnant women began to develop. Even non-family members who did consume Arapaima were expected to stay away. It was believed that the spirit of the fish would overcome the new spirit of the baby, causing harm or death. This is a common taboo in Makushi culture, involving a number of fish species, many of which secrete mucus.

Box 4.7 - 'The fish stone'

Some of villagers interviewed spoke of "fish stones", which apparently attracts fishes to a specific area. There are similar stones for other important game species, such as ducks and deer. These stones were usually shaped in the form of whatever animal it attracted, and their positions were known only to the local *Piaiman*. If these stones were taken from an area, the associated animal is said to move away from the area and follow the stone. According to some villagers, members of the community blame the removal of an Arapaima stone from the area. However, this view was held by a minority. Most interviewees felt that overexploitation was the primary reason for Arapaima depletion in the area. Traditional practices involving rock outcroppings at the source of creeks were also mentioned. At the beginning of the rainy season, a specific large stone or rock at the head of the creek would be "washed" in a religious ceremony. This usually involved rubbing the stone with ripe bananas, traditional beer and other offerings while singing. This was practiced by the *Piaiman*, as well as local villagers on occasion. This ceremony was used to stimulate fish to begin their 'run up' the creek as the water levels rose in the rainy season.

The most frequently mentioned belief spoke of the Arapaima as "*Oma*", which is the Makushi word for demon or evil spirit (Box 4.3). Although most interviewees dismissed the belief as "*old time story*", this story was told throughout the 10 communities visited. Similar claims told of the appearance of sores and scales on anyone that consumed the fish, along with occasional electrocution by lightening. Other, less prevalent, myths spoke of the Arapaima as the "*mother and father of the fishes*" (Box 4.4), or that the fish was "*like human beings because the nurse their young with milk*" (Box 4.6). The belief that the Arapaima represented the "mother and father of the fishes" is particularly interesting, since the story follows that if the fish are consumed, other fish species (many used for food) would disappear from lack of parental care. This story parallels the ecological understanding of the North Rupununi aquatic ecosystem, were the Arapaima is a top-of-the-web predator and an important keystone aquatic species. As such, I would argue that conservation at both the species and ecosystem level was an explicit goal of the taboo in some communities.

The Arapaima taboo was socially enforced through a number of informal mechanisms. First, most of the stories suggest a belief in some form of automatic sanction for anyone that harvested the fish. This included the threat of bursting, sores, electrocution, illness and evil spirits. According to local accounts, persons known to have caught Arapaima, even accidentally, were associated with bad spirits. The offending fisher had to then have the *Piaiman* perform a ceremony to drive away the evil spirits. Only then would other villagers feel safe associating with the offending individual. In these cases, the mechanisms of enforcement went beyond automatic sanction, and included gossiping and ostracism.

The threat alone of being subjected to these social sanctions appears to have been highly effective in preserving the Guyanese population of Arapaima well into the 20th century, even as other populations in Brazil were being overfished (Isaac et al. 1993; Martinelli & Petrere, 1999,). Anecdotal accounts of Arapaima numbers in the pre-harvest period include statements like "*back then the Arapaima was too much*" and "*they had Arapaima like worms in some ponds*". Some past harvesters estimated that at the height of the trade,

a two man crew could harvest up to a 1000 pounds of salted meat per trip, while making 2 to 5 trips per year. These figures suggest that the taboo had been extremely effective prior to harvest, providing a veritable abundance of Arapaima for the taking during the harvest period.

Arapaima taboos for the most part are no longer recognised by the Makushi of the area. Although the taboo has lost most of its effectiveness, however, its legacy is still very relevant to current Arapaima management in the North Rupununi. Firstly, because the taboo existed within the lifetimes of so many current residents, these residents were exposed to a conservation ideology. Pinkerton (1994) argues that the presence of such ideologies at the local level can optimize the benefits of community-based management systems. As such, the Makushi may have been more culturally open to the harvest ban implemented by the Project. Secondly, the actual period of extensive harvesting was relatively short, a widespread Arapaima fishing culture never emerged among the Makushi. More importantly however, the taboo demonstrates how effective informal institutions and social mechanisms can be for the conservation of certain species. Although these institutions were not explicitly targeted by current management efforts, they proved to be a critical part of the Arapaima's recovery, as we shall see in the next chapter.

4.4. Harvest begins

As with many informal institutions in traditional societies, the taboo's reliance on automatic sanctions and social enforcement made it vulnerable to outside influence. With outsiders harvesting and making money, while not being electrocuted, exploding, or being otherwise affected by evils spirits, the taboo rapidly collapsed. Some interviewees even seemed ashamed of these beliefs, arguing that *"Nobody believes in that stupidness anymore*". However, the social mechanisms that sustained the taboo, such as ostracism and gossip, are still very much alive in the Rupununi, and are discussed in later chapters.

According to many villagers, the breakdown of the taboo coincided initially, with the movement of the Wapishana into the area during the 1800s. This occurred due to the

creation of the balata industry, which involved the "bleeding" (rubber-tapping) of a rubber-like resin from the Bulletwood tree (*Manilkara bidentata*). Harvesting balata latex was among the first income generating activity in the North Rupununi, which had previously been characterised by a highly subsistence economy. Unlike the Makushi, the newly arrived Wapishiana did not share similar cultural beliefs and, according to some accounts, began harvesting Arapaima on occasion. However, these accounts suggest that harvest was rare and subsistence based.

This level of harvest continued until the late 1950s, when a man locally known as *"Peruan"* (a Peruvian) moved into the area via Brazil. I was particularly struck by the mentioning of this individual in every community, and from all accounts he was the first to introduce commercial harvesting of Arapaima to the area. He also brought with him fishing technology from Brazil, including harpoons, *carpeesh* (buoyed gillnets with large mesh) and *carpels* (buoyed long lines with a number of large hooks attached and baited with dead fish). Many former Arapaima fishers said that he hired them as guides to locally known Arapaima spawning areas. I kept hearing the same story in every community, where former fishers would say "*Is Peruan learn the whole Rupununi. The people here were bleeders [rubber-tappers] not [Arapaima] fishers. We don't know all the fishing equipment like cadel and carpeesh. Is one man show all the fishermen, that start Arapaima fishing in the whole Rupununi.*"

It appears that *Peruan* operated a small cross border trade in salted Arapaima meat, particularly during the religious "Lenten" period, when Roman Catholic Brazilians fasted on fish. Some respondents spoke of resistance to his fishing activities within some communities, but with cash becoming increasingly important to the local economy, many fishers began to apprentice with *Peruan* following his appearance in the area.

In 1952, a Fisheries Act was passed by the colonial Government declaring the harvest of Arapaima illegal. This is interesting since, from all accounts, Arapaima populations in the area were still healthy. No official explanation for the ban was found. However, interviews with local elders suggest that the ban was part of a request made to the

Government by a well established British settler and naturalist living in the area. There were also suggestions that overharvesting of Arapaima populations closer to coast may have prompted the ban. This law was never effectively implemented, since legal enforcement and management institutions were absent at the local level.

By the 1960s, the regular harvest of Arapaima by *Peruan* had begun, and was accompanied by the increased movement of outsiders into the area (Lowe-McConnell, 2000; 1964). Although most residents still did not consume the fish and were not actively involved in the harvest, it is clear that the Arapaima harvest taboo began to falter. In the late 1970's, increasing demand from Brazil led to a small commercial trade in Arapaima between the Rupununi and Roraima, the bordering Brazilian state. Because of their market contacts, Brazilian fishers still accounted for the lion's share of the harvest.

This changed in the early 1980s, when individuals from Lethem, a larger border town to the South, and Aranaputa (a settler community in the North Rupununi) became involved in the Arapaima trade. These individuals acted as buyers, as well as harvesters on occasion. They sometimes placed orders among known Arapaima fishers, or bought from anyone who had meat to sell. Because the Arapaima was fairly simple to catch, the difference between an Arapaima fisher and a fisher that also catches Arapaima depended largely on the fisher's choice, availability of gear and their experience in the trade. The trade also seemed to have involved some level of distrust between the buyers and harvesters, with many fishers leaving or avoiding the trade due to payment issues. Most of the fishers involved in the harvest sold their catch to middlemen who would transport the dried fish to Brazilian markets. In the late 1980s, local fishers began to both harvest and market Arapaima, and the trade increased substantially. This was facilitated by the introduction of large gill nets, or *carpeesh*, in the late 1980s.

The heaviest harvests appear to have taken place in the late 1980s and early 1990s. However, most respondents agreed that by 1995 populations were noticeably reduced and harvesting had begun to decline sharply. This correlated with a decline in harvesting by outsiders. Some respondents argued that commercial harvesting was no longer

economically feasible, due to reduced stocks, significant travel costs, and the increased effort required. The fishery thus shifted from a significant outsider presence to predominantly North Rupununi fishers, who mostly used the fish for subsistence or local sale within the region.

As the Arapaima population fell in the 1990s, there was a growing sense of alarm within some North Rupununi communities about the health of the fishery. This led some community leaders to voice their concerns over the state of the Arapaima fishery during regional meetings with Government officials. However, no significant action was taken, and unregulated harvest of the fish continued.

In the early 1990s, two major events took place that would forever change resource management the North Rupununi. First, an unpaved road was constructed through the area, linking the capital Georgetown with the Southern town of Lethem, on the Brazilian border. At the same time, rumours had begun to spread in the communities about the creation of a large forest reserve somewhere in the area. This rumour quickly materialized with the declaration of the Iwokrama Rainforest Reserve and its organisational structure, the Iwokrama International Centre for Rainforest Conservation and Development (hereafter Iwokrama Centre).

4.5. Winds of change

4.5.1. The coming of Iwokrama: community foe or ally?

The Iwokrama Centre is an autonomous international organisation responsible for the management of a 360000 ha forest reserve in Central Guyana. The Centre is governed by a 16 member International Board of Trustees, made up of a Chairman, the Centre's Director-General and other local and international representatives appointed by the President of Guyana and/or the Commonwealth Secretary-General. The Board is responsible for appointing the Director-General, determining Programme policy, and approving the Centre's general strategies. The Director-General reports directly to the Board and is responsible for implementing decisions made by the Board. Iwokrama's core

programmes are Human Development, Conservation and Use of Forests and Biodiversity, and Business Development.

The concept for the Centre emerged from the 1989 Commonwealth Heads of Government Meeting in Malaysia. At the meeting, Guyana's then President offered an area of undeveloped rainforest to the international body as a research and demonstration site for how sustainable development can be accomplished in developing countries. A joint Guyanese-Commonwealth team was then established to formalize the new Centre's mission and identify the Reserve location, which culminated in the publication of their report in June 1990. Further development of the Reserve's objectives and management guidelines by both Guyanese and international consultants continued in the following years. Then in 1993, US$3 million in start-up funding for the Centre was made available by the United Nations Development Programme (UNDP) through the Global Environmental Facility (GEF). By 1994, the Centre established a local presence in the Iwokrama Forest with the building of a field station.

With the groundwork mostly complete, the Iwokrama Centre was formally established with the Iwokrama Agreement in 1995. The Agreement was signed by Guyana's President and the Secretary-General of the Commonwealth Secretariat at the Commonwealth Heads of Government meeting in Auckland, New Zealand, and subsequently passed by the Guyana parliament in late 1995 as part of the *Iwokrama Act.* In the following year, Guyana's President signed the Act into law.

It is clear that the Iwokrama Centre was the result of a political decision made by Guyana's highest office, and had more to do with increasing Guyana's international visibility than concern for the development of North Rupununi communities. Additionally, aside from the few Guyanese directly involved in the Programme's development, the process leading to the Centre's establishment was primarily internationally driven. The communities of the North Rupununi, who traditional hunted and farmed in the Iwokrama area, were notably absent in the Centre's identification and development. Also, of the thirteen major North Rupununi communities, only the two communities within the Reserve's perimeters (Surama and Fairview) were initially

identified to benefit from or be involved with the Programme. Not surprisingly there was significant fear and resistance among the communities to the Centre's establishment (Allicock 2003). In meetings between international consultants following the decision to target only two communities, leaders from the village of Surama argued for the inclusion of the other settlements in the region. There was also increasing tension within the communities over the apparent bias towards certain communities. Many community leaders began discussing potential options for increasing regional cohesion in order to mount a united and more powerful front in negotiating with the Centre.

4.5.2. The creation of the North Rupununi District Development Board

Following the legal establishment of the Iwokrama Centre in 1995, a community outreach programme was launched in an effort to increase local awareness about the Centre and address local resistance to the Reserve. The outreach programme was designed and implemented by Red Thread, a local NGO, on behalf of Iwokrama, with funding from the IDRC. Through the Programme a number of meetings and discussion were conducted both within the communities and between regional leaders and representatives. It was largely through this process that the North Rupununi District Development Board was formed in January 1996.

The North Rupununi District Development Board (NRDDB) is an indigenous community-based organisation, headed by village leaders and other community members from Guyana's North Rupununi District. The Board is governed according to a constitution, and since its formation in 1996 it has held over 50 general meetings on a bi-monthly basis. It represents 14 communities (approximately 3,500 people) within and surrounding the Iwokrama Rainforest Reserve in Central Guyana (Forte et al. 1999). Initially established as a formal link between the communities, Government agencies, and Iwokrama, the NRDDB has since taken responsibility for the planning and coordination of most educational, developmental, cultural and research programmes in the North Rupununi. The Board currently coordinates a number of resource management and economic development programmes including the Arapaima project and its linked

initiatives (Figure 4.1). In 2002 the President of Guyana appointed the NRDDB's nominee to the Iwokrama International Board of Trustees.

4.6. The Arapaima Management Project

4.6.1. Project overview

The Arapaima Management Project is one of the many NRDDB initiatives, and is characterised by a number of sub-components. The Project began with the NRDDB endorsement of the legal ban on Arapaima harvesting, which was followed by surveys of the local Arapaima population and the training of local fishers in the survey methodology. This then led to the development of the Arapaima Management Plan. The Management Plan defines the processes and responsibilities for the managed harvest of Arapaima under the Project (described in Sect. 4.7 below).

The initiative was also linked to other NRDDB-Iwokrama initiatives such as river checkpoints (Box 4.1), which fall under the Conservation Contract Programme, and the education and awareness campaign of the Community Environmental Worker Programme (Box 4.2). Project related activities under these programmes are co-ordinated through the NRDDB.

Box 4.1 - Community Environmental Workers

The Community Environmental Workers (CEW) programme was launched by Iwokrama in 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 community rangers. The concept was further developed during the second North Rupununi wildlife management workshop in July 1998.

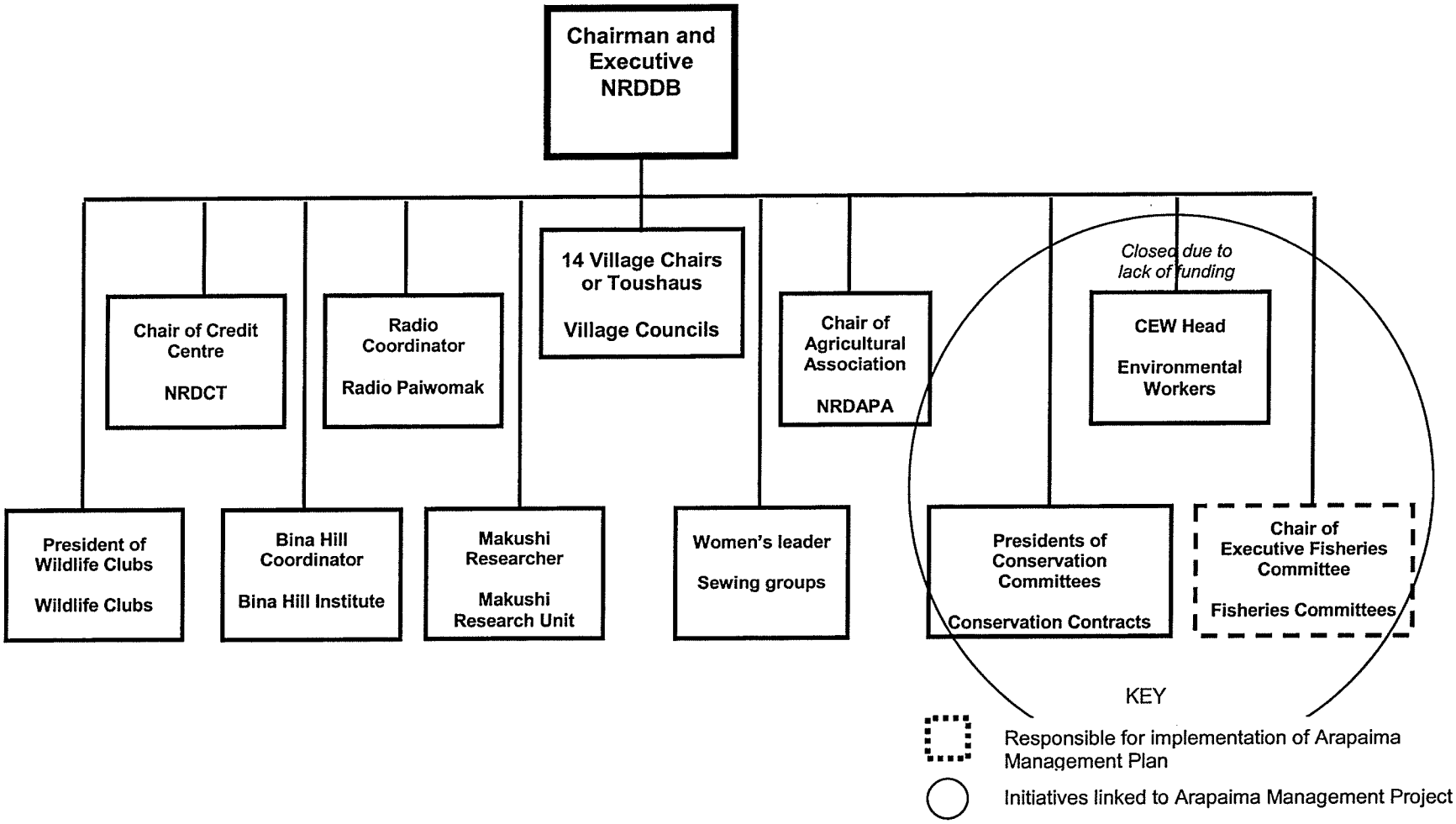


Figure 4.1 - Organisational Structure of the North Rupununi District Development Board (2003)

Figure 4.1 (continued) - Organisational Structure of the North Rupununi District Development Board (2003)

Representative	Description
Chairman	Elected to position in bi-annual elections. Open vote at NRDDB meeting. Cannot be occupied by same person for more than two consecutive years.
Executive Committee	Comprised of a Chairman, Vice Chairman, Secretary, Treasurer, and Assistant Secretary Treasurer. Elected to position in bi-annual elections. Positions cannot be occupied by same persons for more than two consecutive years.
Toushau/ Village chair	Elected leaders of the 14 communities. Voted in by general elections in each community.
Chair of Credit Centre	Elected position. The North Rupununi Credit and Development Trust (NRCDT) developed from the UNDP Poverty Alleviation Programme supported credit centre. The Ministry of Amerindian Affairs works with the NRDDB and the NRCDT to manage the credit centre. The Centre provides short terms loans to community members for enterprise development.
Bina Hill coordinator	Appointed position. The Bina Hill Institute acts as the location for the meetings of the NRDDB and most regional workshops and training sessions. The Institute falls under the umbrella of the NRDDB, with close links to Pronatura and Iwokrama.
Radio coordinator	Appointed position. Radio Paiwomak is Guyana's first and only community radio station. It began as a joint project between the NRDDB, Iwokrama, UNESCO, the Guyana Broadcasting Cooperation, and the IDRC.
Makushi Researcher	Elected position. The Makushi Research Unit emerged in 1995 as a joint research initiative by local communities, NRDDB, Iwokrama, and the University of Guyana's Amerindian Research Unit. The unit consists of researchers, primarily women, from local communities who are employed to carry out research on social, economic, and ecological aspects of life in the North Rupununi.
Women's Groups	Elected representative. Iwokrama facilitated the creation of community sewing groups in 1996. Composed predominantly of women, these sewing groups produce clothes, artistic embroideries, clothing, and mosquito nets. Groups in some communities are currently inactive.
Executive Fisheries Committee	Elected position. Vote carried out at open regional fishers meeting. Composition has remained the same since creation of the committee (See Box 2 for description of committee).
President of Wildlife Clubs	Elected position. Vote carried out at meeting of Wildlife club members. Programme funded but Iwokrama and the US Audubon society, and jointly implemented by Iwokrama and the NRDDB. Involved the creation of youth Wildlife Clubs in each of the 14 communities.
CEW Head	Elected position (See Box 4.1).
Presidents of Conservation Committees	Elected positions. One representative from each community (See Box 4.2).
Chair of Agricultural Association	Elected position. The North Rupununi District Agricultural Producers Association is the local representative body for farmers and agricultural producers. NRDAPA is currently working with the University of Florida, IICA, Ministry of Agriculture and NARI to develop peanut production systems in the North Rupununi.

Fisheries committees were created to implement the Arapaima Management Plan, both at the community level (Community Fisheries Committees), and at the regional level (Executive Fisheries Committee). However, the Plan has only been implemented to a point. The Arapaima surveys have continued yearly, and local fishers seem to be adhering to the harvest ban, as indicated by the growth in Arapaima populations. However, no quota harvesting has occurred, and as such no direct economic benefits have gone to the communities from Arapaima harvest.

Box 4.2 - Conservation Contracts

The Conservation Contract programme also emerged during the 1998 Wildlife Workshops. Under the initiative, formal agreements were signed between individual communities and Iwokrama, where Iwokrama made 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 that period. The Conservation Contract payment was used to operate checkpoints in the river communities of Rewa and Apoteri, and was managed by community conservation committees created specifically for that purpose.

4.6.2. Local involvement in problem definition.

The origins of the current Arapaima Management Project can be traced back to 1998 (See Appendix 3). Upon becoming a legal entity, the Iwokrama Centre funded and organised a four day workshop in April 1998. The workshop was requested by members of the NRDDB, over concerns about the exploitation of regional wildlife stocks. The workshop brought together an environmental lawyer, 37 village leaders and community members from the then 11 NRDDB communities, and 8 representatives from 4 additional settlements. The workshop was facilitated by Iwokrama's Senior Wildlife Biologist and Social Scientist.

Workshop participants discussed the importance of wildlife in the subsistence and culture of the Makushi people, and examined the role of wild animals in forest and savannah ecology. Local participants identified uncontrolled savannah and forest fires; the introduction of new hunting and fishing gear, resulting in the overharvest of certain species; and the overuse of traditional plant poisons for fishing in creeks and ponds as the major threats to local wildlife. They also expressed concern over the level of local poverty; poor employment opportunities; illegal marketing of wildlife in Brazil; loss of

Makushi culture and traditional wildlife management institutions; lack of a regional wildlife management body; lack of education and training in wildlife management; and a lack of access and understanding of current wildlife laws (Watkins et al. 1999).

The workshop led to the drafting of a letter on behalf of the NRDDB to the Chairman of the National Biodiversity Advisory Committee (NBAC) of the Environmental Protection Agency. The letter requested the NBAC's *"...assistance in curbing a situation that is very critical to the rehabilitation of endangered species of wildlife [in the area]"*. Support was specifically sought for training and employment in wildlife monitoring and surveillance; education and awareness about local wildlife threats and laws; and communication with neighbouring countries to stop the illegal trade in local endangered species. The letter was prepared with assistance from the non-local workshop participants and signed by the participants from the communities.

A follow-up workshop was held in July 1998, and coordinated by the NRDDB, Iwokrama Centre and the NBAC. This meeting included a broader range of participants, including community representatives, NRDDB members, Iwokrama personnel, NBAC officers, and representatives from the Environmental Protection Agency; Guyana Forestry Commission; Guyana Police Force; Office of the President (OP); Guyana Defence Force; Guyana Information Service; Regional Government; Scientific Authority of the Wildlife Division (under the OP); and the Centre for the Study of Biological Diversity at the University of Guyana. The workshop focused on issues coming out of the previous workshop, and examined potential partnership arrangements between communities, Government organisations, and NGOs for the management of local wildlife. Discussions also centred on the development of education and outreach programmes to increase awareness of the values and threats to wildlife in NR, and the potential for the creation of alternative and sustainable livelihoods in the area. In 1999, a book summarizing the workshops' results and discussions was the published by the Iwokrama Centre. This publication, titled "Community-based Wildlife Management in the North Rupununi", was distributed to the NRDDB, North Rupununi communities, other NGOs, and Government departments (Forte et al. 1999).

4.6.3. Project formulation

During the wildlife workshops in 1998, Arapaima overharvest was identified as a major concern by community participants. Acting on these concerns, the Centre's Senior Wildlife biologist began reviewing literature related to Arapaima ecology and management. In the process, he came across the Arapaima initiative at the Mamirauá Reserve, and research with Brazilian fishers to survey Arapaima. In 1999, Iwokrama brought together a small group of community fishers to conduct an experimental survey of Arapaima in 4 ponds in and around the Forest Reserve. The findings of these surveys were inconclusive. According to the Iwokrama biologist "*the knowledge was there but it would take too long to develop and standardize our own methodology. We needed to fast track the process*".

Iwokrama then provided funding for the Senior Biologist and three Portuguese speaking local fishers to visit the Mamirauá Reserve in 2000. During the visit a Wildlife Conservation Society (WCS) workshop was conducted to train Brazilian, Peruvian, and three Guyanese from the North Rupununi in the survey method. The trainees also participated in local management activities. Later that year, Iwokrama hosted a Regional Technical Workshop on Critical Issues in Wildlife Conservation in the Guiana Shield. This workshop was attended by Brazilian and UK aquarium fish specialists and the Mamirauá scientist involved in developing the Arapaima counting method. Following the workshop, Iwokrama arranged a meeting in the North Rupununi between the NRDDB, Iwokrama, Mamirauá scientists, aquarium fish specialists, and officials from the Fisheries Department of the Ministry of Fisheries, Crops and Livestock.

It was at this meeting that the DOF representative raised the possibility of a managed Arapaima harvest being allowed under the new Fisheries Act being prepared for parliament. Unlike the original 1953 Fisheries Act, which did not even mention inland fisheries, the Part II of the 2002 bill allows for fisheries management and development under "fisheries plans". These plans must satisfy specific structural and processual requirements, and "Each fisheries plan and each review thereof shall be submitted to the Minister for approval" (Bill 2002). Once the project was based on a management plan

that satisfied these requirements and received ministerial approval, Arapaima harvest would be legalized in the region, and would grant sole harvest rights to the institutions covered by the plan.

As a result of this meeting, the NRDDB agreed to support the enforcement of the law banning Arapaima harvest, and work with the Mamirauá scientist towards the development of a Management plan for the species. A Fisheries Task Force under the NRDDB was also established, with four persons appointed to examine local fisheries, identify potential livelihood alternatives, and participate in the development of the Management Plan. The DOF representative also agreed to review the draft Management Plan to ensure it satisfied the legal requirements of the new Act.

In 2001, funding was acquired from the Wildlife Conservation Society through Mamirauá to facilitate a training workshop in Guyana. This training Programme took place in March 2001, and included fishers representing all of the then 13 member communities of the NRDDB. 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. Following the workshop, a joint preliminary stock assessment was conducted by the Brazilians and local counters, revealing only 425 Arapaima over 1 meter in length were left in the area. Later that year, a second Arapaima stock assessment was conducted by local fishers, the Mamirauá scientist and Iwokrama staff which identified 822 Arapaima.

4.7. The Plan

4.7.1. Plan Overview

The management plan refers to an effort of the North Rupununi fishers to experimentally manage Arapaima (*Arapaima gigas*) for a period of three years. The guiding philosophy of the plan is that "local social organisation 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 organisation institutions and increase local fishers' income. The Plan also requires a closed season between December

and February, a minimum size limit of 1.6 meters, and a total moratorium on the harvest of breeding adults.

4.7.2. The Plan's development

In the beginning of 2002, Iwokrama facilitated a meeting between 12 representatives from the then 13 communities of NRDDB, the Mamirauá scientist and an Iwokrama research assistant. The meeting focused on the design and implementation of a management system for Arapaima in the North Rupununi. The Mamirauá scientist presented the Brazilian project as a successful management system, and suggested that the system could be tailored to the conditions in the North Rupununi. The community representatives agreed to adopt the Brazilian model, and accepted an offer by the Mamirauá scientist to lead the design of the management plan. It was also agreed that community representatives would make decisions pertaining to the delineation of the management area, fisher organisation, the development of harvesting procedures (counting, monitoring, fishing quota determination, fishing quota sharing, fishing, and marketing and selling), enforcement, and feedback and transparency mechanisms (AMP 2002). Another major decision coming out of the meeting was that each community would form a "Community Fishery Committee" (CFC) to represent the interests of the community's fishers.

Following the meeting, a draft Arapaima Management Plan for the region was prepared by the Mamirauá scientist. Copies of these documents were then sent to village councils in each community for review. As agreed at the previous meeting, the Brazilian, Iwokrama research assistant and a NRDDB member then visited the 13 communities. Community meetings were held in each location, with the Mamirauá scientist explaining the major aspects of the draft management plan. Upon the request of the community, explanations were sometimes interpreted in Makushi by the NRDDB member. A second two-day meeting to revise the draft was held 5 days after the last community visit. This meeting was attended by 12 representatives from the new formed Community Fishery Committees. During the meeting the CFC representatives presented their comments on the proposed plan, which were taken note of and discussed (AMP 2002). It was also

during this meeting that the Executive Fisheries Committee (EFC) was elected by the CFC representatives. After this meeting a second draft Plan was created by the Mamirauá scientist, which left the Committees to decide how the individuals involved in harvesting would be identified; how long the plan would last; and where and how funds would be acquired to implement the plan.

The EFC then presented the draft Management Plan to the NRDDB at its bi-monthly session in March, 2002. The NRDDB give their support for the plan and appointed two members to serve on the EFC. Following this meeting, a third version of the Plan was presented in separate meetings to the representatives from the Ministry of Fisheries; Ministry of Amerindian Affairs; Ministry of Local Government and Regional Development; and the EPA. Comments emerging from these meetings and subsequent reviews were incorporated into the production of a final Arapaima Management Plan, which is at the heart of the current NRDDB Arapaima management project.

4.7.3. ***Proposed*** implementation and organisational structure

According to the Plan, fishers in each community should be organized into Community Fisheries Committees (CFCs). Each CFC should consist of at least two persons, who must be elected and mandated by the community and the village leaders. They are to represent the interests of the fishers in each community, and are responsible for monitoring, enforcement and organizing the fishery at the community level. The plan also calls for an Executive Fisheries Committee (EFC), which would be the umbrella institution for all the CFCs. The EFC should comprise of two positions appointed by the NRDDB and five positions elected by the Community Fishery Committee members. 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, the plan states that the EFC "will carry out the management plan even if the authorised officers are absent".

The Executive Fisheries Committee, in conjunction with Iwokrama and the CFCs, is responsible for annual surveys of the area's Arapaima population, determining harvest

quotas, and coordinating the harvest. They are also the regional authority with respect to monitoring and enforcement of the Plan, marketing the meat, resolving conflict among fishers and community outreach regarding the plan (See Figure 4.2 for ***proposed*** organisational structure).

A number of associated institutions were also created under separate NRDDB-Iwokrama initiatives, and have impacted indirectly on the implementation of the Arapaima project. These include the Community Environmental Workers (CEW) programme (Box 4.1) and the Conservation Contract initiative (Box 4.2).

The CEW programme was launched in 1999, and led to the training and employment of up to two community members in each of the North Rupununi communities. A CEW was a part-time village worker, working 12 days per month under the joint supervision of Iwokrama and the respective Village 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. A large part of the CEWs' mandate was an ongoing awareness campaign focussed on the Arapaima ban and the need for its management. However, in early 2003, funding for this project came to an end, and the project is no longer active.

The construction and operation of two checkpoint stations in the communities of Apoteri and Rewa were also launched under the Conservation Contract Programme. These sites were selected due to their strategic locations at the confluence of the Essequibo and Rupununi Rivers, and at the Rupununi and Rewa Rivers respectively. A third checkpoint was established in 2003 at the farming outpost of Hiawa along the Rupununi River. Salaries and operational costs for this outpost were provided through funding from the Iwokrama Centre.

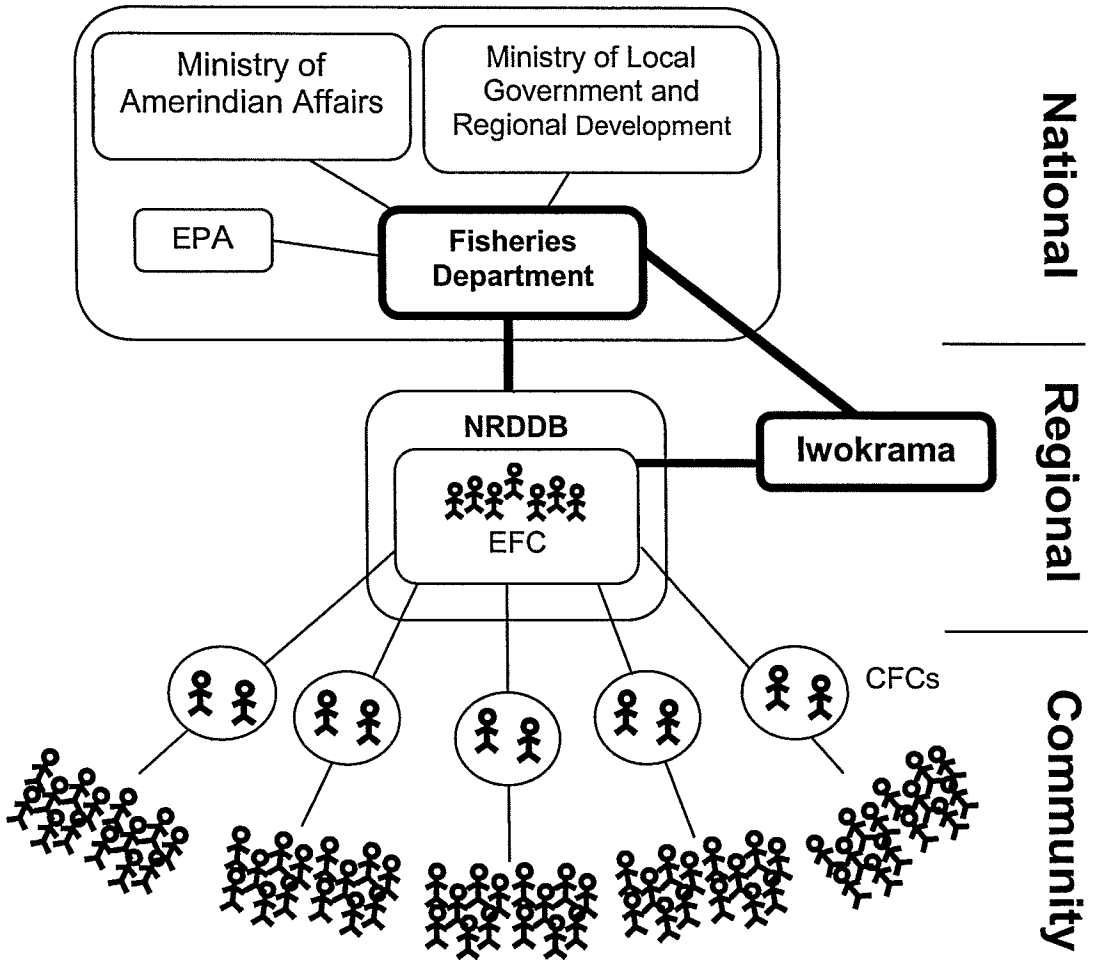


Figure 4.2 – Proposed fisher's organisational scheme.
The Executive Fishery Committee will be supervised by the Ministry of Fisheries, Ministry of Local Government and Regional Development, EPA and Iwokrama; and it represents the interests of the Community Fishery Committees, which in turn, represent the interests of the fishers from all thirteen communities (Source: AMP 2002).

4.8. The Reality

With the community ban on Arapaima harvest in effect, the initiative has led to a number of both biological and socio-economic benefits. Annual Arapaima surveys have been carried out by the NRDDB since the original training workshop. These surveys have provided the empirical evidence to support local claims of the Arapaima's recovery. Four surveys have been conducted in the management area (Figure 4.3) since 2001, with the total count of adult and juvenile Arapaima increasing from 425 in March 2001, to 1200 in December 2003 (Figure 4.4) (Castello 2001, Jafferally 2002, Iwokrama 2004). According to project records, these surveys have generated income for individuals involved in the surveys, with over G$3,225,000.00 (CA$27300.00) being paid in salaries, and for rental of community equipment, in the past three years (2001-2003).

In 2002, the Arapaima Management Plan was submitted to the Ministry of Fisheries Crops and Livestock for inclusion under legislation for the new Fisheries Act. Although other sections of the Act have been approved by parliament, the section regarding inland fisheries and the allowance for management plans has not occurred.

According to one Government source, pressure from the private sector interest to pass certain aspects of the new Fisheries Act resulted in a sectioning of the Act. For instance, sections of the Act which allowed for export of shrimp to European markets were excised from the Act, submitted for Parliamentary consideration, and approved as a separate policy. However, other aspects of the Act, including the allocation for management plans, do not seem to be a high priority for the Ministry, and have thus seen little movement. The Government's delay in approving the plan can be attributed to additional factors, including a complicated political process, a lack of political commitment at senior levels, and the low national economic importance of the fishery.

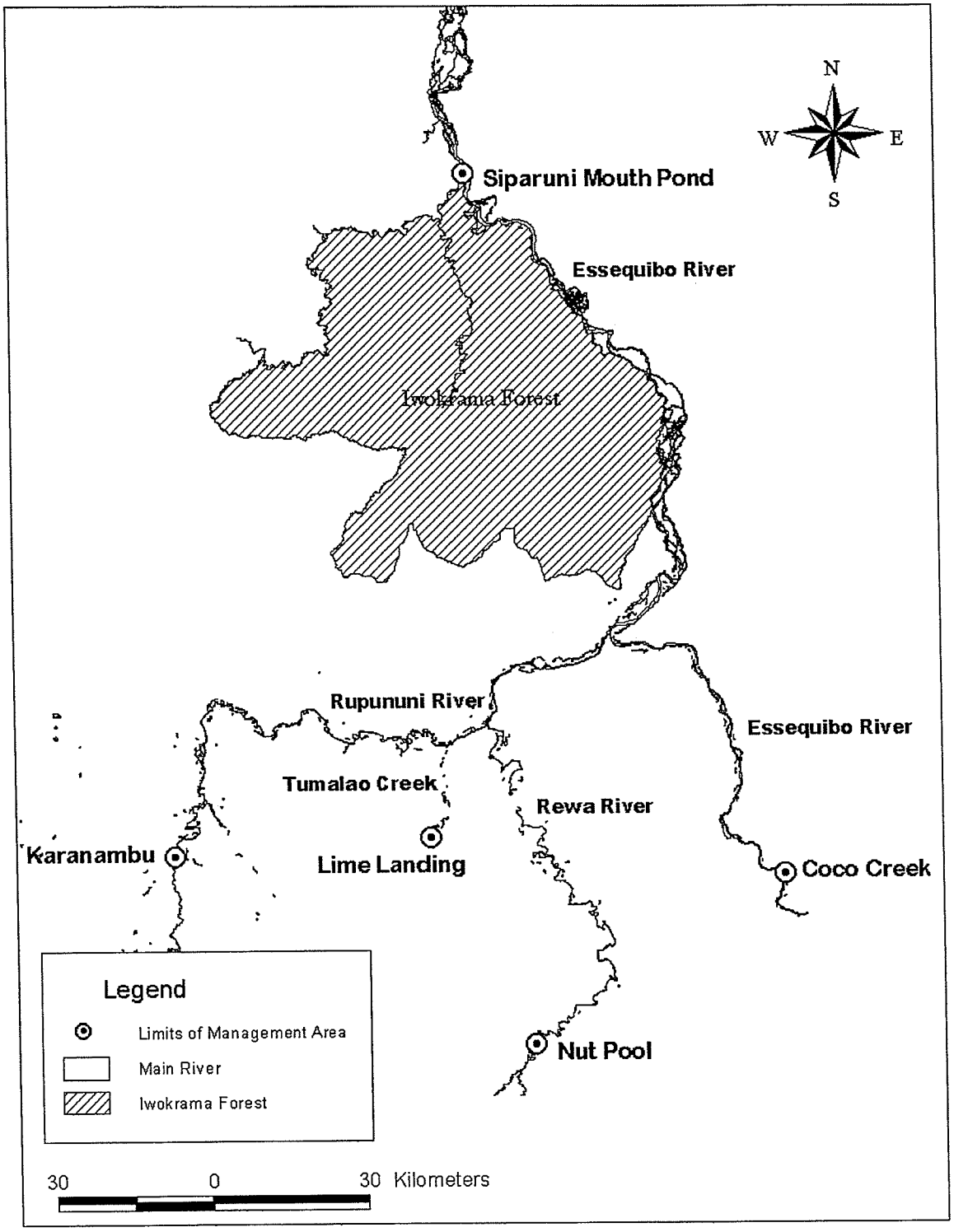


Figure 4.3 – Management area for the Arapaima Management Project

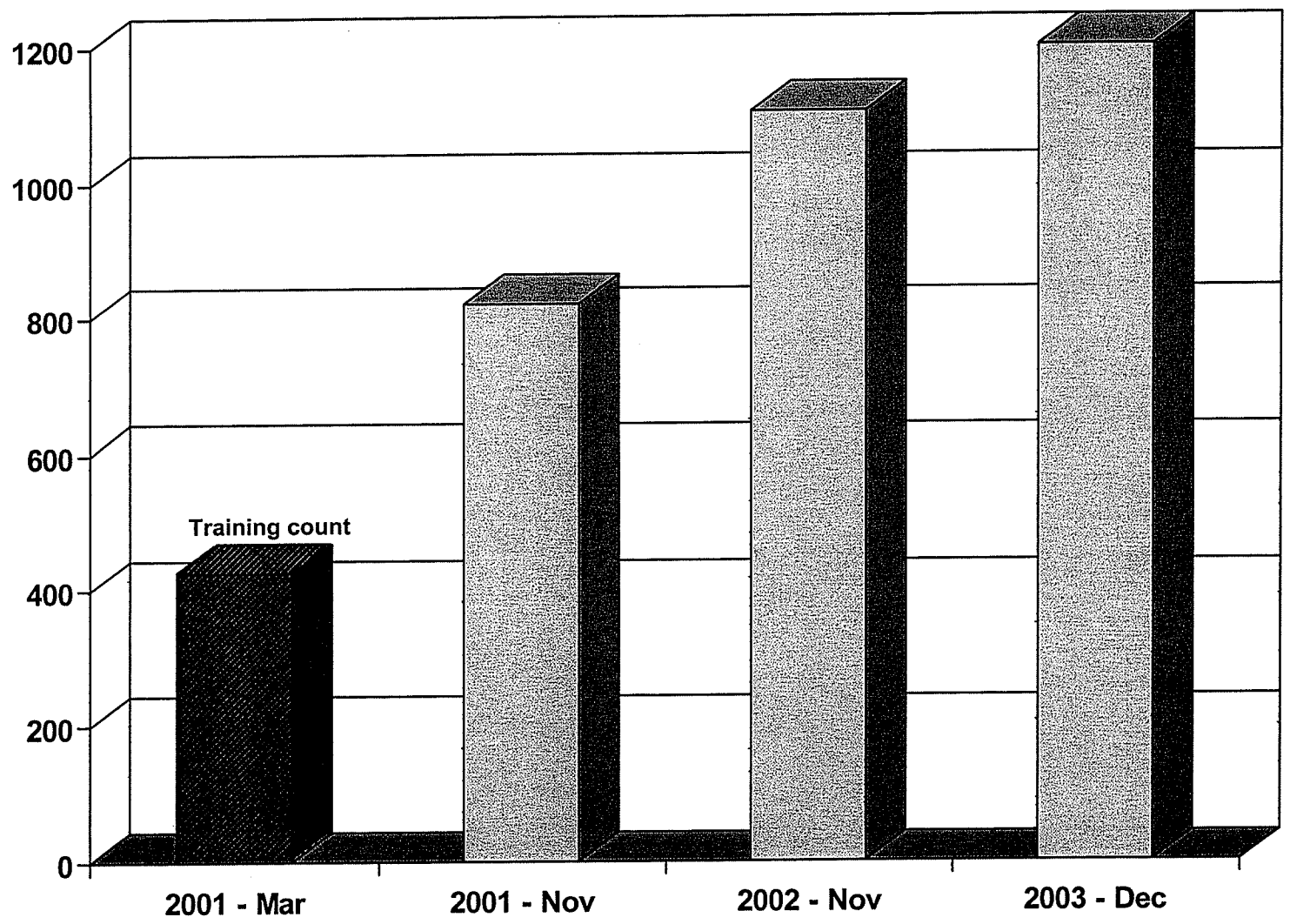


Figure 4.4 - Surveyed Arapaima populations in the management area

Without supportive legislation, the plan to begin managed harvests is on hold. As a result, the project has yet to produce direct economic benefits for the communities involved. Furthermore, the institutions created to implement the Management Plan have begun to break down (Table 4.1). For instance, many of the CFCs and river checkpoints are either dormant or non-functional. These structures were created primarily to manage quota harvesting, which has yet to take place. As such, many CFC members still identified themselves as such, and felt that once harvesting was approved they would perform their roles in harvesting and monitoring. A full assessment of these institutions will therefore only be possible after harvesting gets underway.

Although the current situation seems bleak, the regional Arapaima stock appears to be growing yearly, even without the aid of these formal institutions. As we shall see in the next chapter, the apparent success in conserving the Arapaima may have more to do with the informal social mechanisms than the Project's formal management institutions.

Table 4.1 – Evaluation of Arapaima management in the North Rupununi (prepared for community use)

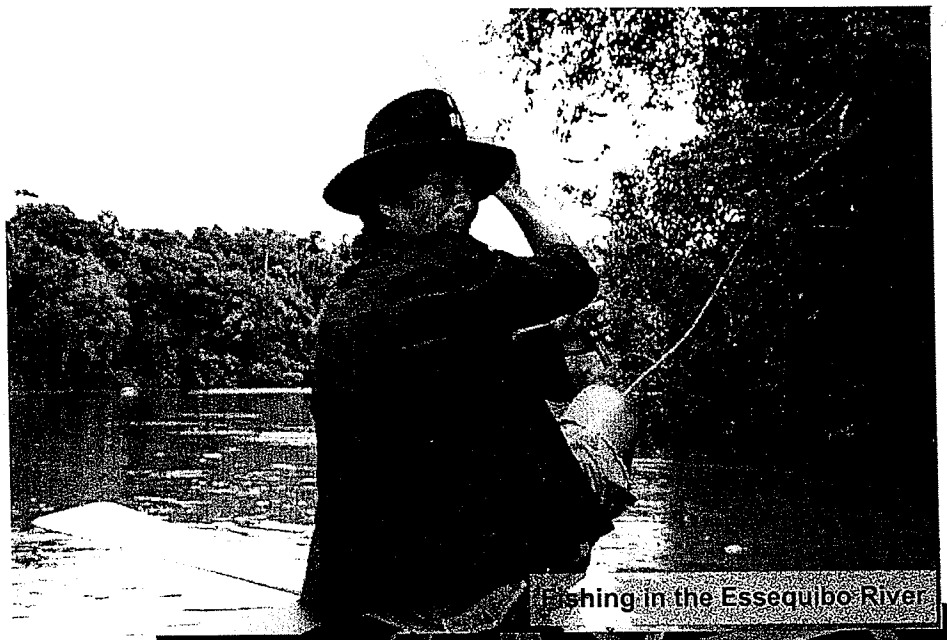
Questions	Common answers	What might happen if fishing starts too soon	How to get ready for fishing
How is the ban working?	All felt Arapaima was coming back. Most felt it was because of a change in attitudes, and people were scared because *"More eyes watching"*. Still cases of harvest; *"Police themself selling"*	Return of Arapaima fishing might cause more illegal catching. Most think that everybody will be allowed to fish. May result in more movement of Arapaima to Brazil. Involvement of "police" in sale will affect EFC's ability to control harvest. "Nobody could do me anything if police doing it".	Need to have things in place, e.g., working CFCs, checkpoints, etc. Need to work with police and other local authorities to prevent illegal harvest.
How well do you understand the plan?	Most know of the plan and have a basic understanding of the project. However, many expect to be able to fish Arapaima once plan is approved. Also expect local use and sale in community.	May lead to more Arapaima caught than quota, causing another drop in numbers. Persons upset, feeling "left out" by the project. *"...will cause a lot of underhandedness"*	A new set of meetings are needed to better explain the rules of the plan to the communities. Radio programs and pamphlets focusing on rules also useful. Have discussions with local traders.
How are the CFCs working?	Most not working; some never met. Few persons still active in awareness drive some communities. But many people paying attention to what others are doing; people are scared because "More eyes watching"	Not ready for harvesting, no one to monitor/coordinate harvest in the communities, would cause illegal fishing.	CFC formation can be done during the awareness meetings in the communities. Need to select dedicated persons; set up a regular reporting system; maybe be part of village council; and have a regular voting system.
How is the EFC working?	Active through NRDDB meetings; Most happy with activities. Some complaints include few general meetings; no elections Some lack of trust: *"EFC don't have much river people"*; *"Member themselves doing illegal catching"*	EFC will receive a lot more attention when harvesting starts. May have to deal with a lot more complaints. Some already questioning EFC ability to do anything to illegal harvesters.	May need to hold new elections; have a special representative from river communities; be prepared to enforce penalties on illegal harvesters. Must have a system for dealing with conflicts between fishers. In the end it will have to show to the ministry and the people that it is able to manage the project.

Table 4.1 – Evaluation of Arapaima management in the North Rupununi (prepared for community use)

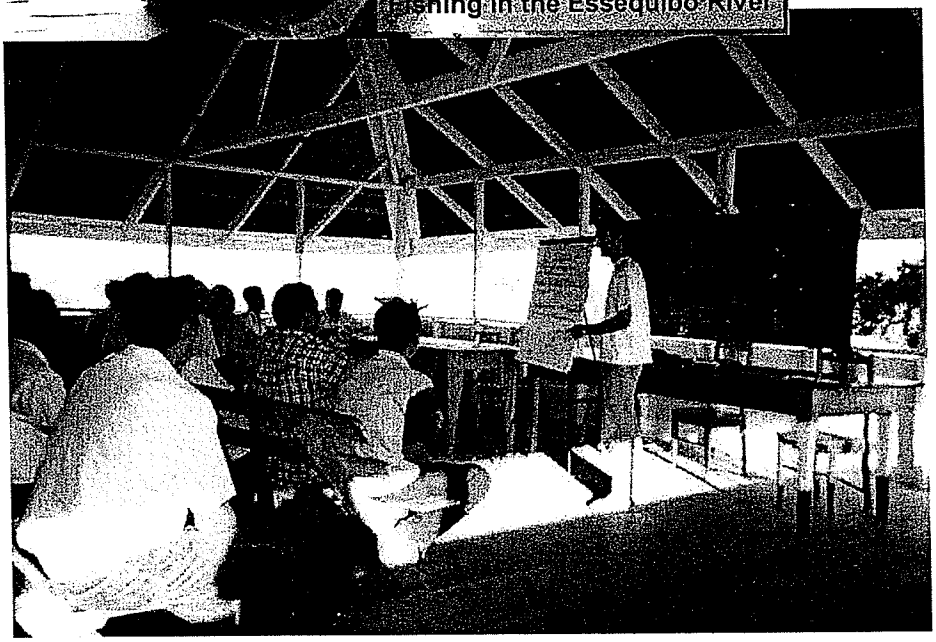
Questions	Common answers	What might happen if fishing starts too soon	How to get ready for fishing
How are the checkpoints working?	Apoteri and Rewa not working; Hiawa working a little, with some data sheets; but not a lot of fishing recoded. "*Checkpoints not a good idea*" "*Can't stop people*"; "A *lot of travelling at night and changing movements*"; "*Will never be able to catch determined people.*"	No way to really stop/check people; Will need more money and people to work. Persons may also change their movements to get past checkpoint. Hard to do catch people that don't want to get caught. "*Boat patrols better, but they expensive and people could still hide from you*".	Will only work if people are always at the checkpoint and they have some way of making sure that people stop in. May also be possible to use the money that would be spent on the checkpoint to run boat patrols. This can be done with an engine and/or with CFC members going out in their canoe and checking.
How are the counts working?	Most satisfied with counts. Some concern. No one has been retested. "*They didn't count some lakes*"; "*More counters added, some might not be as good as others.*"	If counts used to fix quota, people will take a bigger interest in the counts. May get more complaints about who counting and how they are counting. "*Saying more Arapaima around than what they actually count*". "*Could lead to people doing their own thing.*"	Need to retest the counters. Have a count and then a complete harvest of the pond to check if the count is the same as the real amount of fish in the pond. Have some sort of training period for new counters and then have them tested when a pond is being harvested.
How should harvesting happen?	Most feel harvest should begin. Some from river communities think populations still too low; "*Savannah people still coming here and fishing*". "*We need another couple of years, let them come back to how they were*". Others say different communities should get different quotas, because everybody depends on it differently.	Some problems could happen when fishers from one community fish in areas close to another community. River communities may say that they are not represented, because there are not a lot of river people on the EFC. Some communities might also argue for larger quotas.	EFC and community members will have to: Decide how long to wait before starting harvest. Develop a plan of how to settle disagreements between different communities about fishing areas. Decide who will catch and what is the best way of sharing quotas. Can use Aquarium fish harvest system as model.

Chapter 5

"More eyes watching...": The role of community self-organisation in Project development and implementation



Fishing in the Essequibo River



Fisheries meeting at the Bina Hill Institute

5.1. Introduction

By examining the history of resource management in the North Rupununi, I identified three major periods of community organisation that facilitated the development and implementation of the Arapaima Management Project. The first was the formation of the NRDDB, and the establishment of a working partnership with the Iwokrama Centre. These institutional structures and partnerships led to the second phase, which was the development of the Project and the creation of local management institutions, such as the Executive and Community Fisheries Committees. The third period involved the emergence of informal social monitoring and enforcement of the harvest ban. In this chapter I will examine the roles of self-organisation within the communities, and internal and external forces, in each of the three periods.

5.2. Laying the foundation

The formation of the NRDDB laid the institutional groundwork for the subsequent development of the Arapaima project and associated initiatives. This period of self-organisation seemed to have been stimulated by the dual threats of an international roadway being constructed through the area and, more importantly, the establishment of the Iwokrama Rainforest Reserve.

A number of community leaders had long recognised and discussed among themselves the need for increasing *"...their collective strength and voice to guard their interests and secure their development"* (Allicock 2003). However, on their own, they had not been able to mobilize and coordinate the significant commitment, resources and recognition required to create a functional regional organisation. The need for regional solidarity took on a renewed sense of urgency with the appearance of the unknown Iwokrama threat. However, rather than hindering this process, Iwokrama gave communities access to resources, and the expertise of organisations such as the NGO "Red Thread" dedicated to community development. These financial and human resources proved to be the catalyst in the NRDDB's formation. As such, "self"-organisation in the NRDDB's development was ultimately realized through a combination of internal aspirations and external transformative forces.

However, the close association between the NRDDB and Iwokrama created dependencies on both sides. For instance, Iwokrama may not have been able to engage communities without the NRDDB and associated institutional structures. In addition, the NRDDB's initial dependence on Iwokrama support and resources may have overly exposed the Board, and its associated projects, to Iwokrama's influence. Although the relationship between these institutions remains close, the NRDDB has moved towards increased self-sufficiency by creating independent linkages with other partner institutions and the Government. It remains to be seen whether the NRDDB can exist in its present form without continued support from Iwokrama.

5.3. The Arapaima Management Project

5.3.1. Two projects, different results

The second major period of community organisation was the development of the Arapaima Management Plan and supportive management institutions. The Project and most of its components are modelled after Arapaima management in the Mamirauá Reserve. Therefore, in order to understand the difference in project outcomes, it may be useful to first compare and contrast the factors leading to the development of both projects.

In the Brazilian case, Arapaima fishing had been practiced in the area for over a hundred years (Vianna et al. 2004). There were also established regional markets both within the State and in other regions of Brazil. This harvest was active until it was banned in 1996 by State authorities. The Mamirauá Sustainable Development Institute stepped in almost immediately with a plan to re-establish a managed, but legal, trade.

The resulting project began with only four communities, and with little threat from outside or commercial fishers. The Centre was also able to negotiate with Governmental authorities to allow a harvest quota for the four communities. Fishers in the communities were given the responsibility of deciding how to organize themselves for the harvest. This led to the creation of a Production Association which, aside from managing harvests and monitoring at the community level, also served as the sole marketer for the catch.

The Association was therefore driven in part by financial objectives, rather than just conservation objectives. The Institute further facilitated the project by identifying and developing green markets in other parts of Brazil. This had the dual effect of by-passing middlemen, and substantially increasing the value of the product. As such, the project, through the efforts of Mamirauá Institute and the Production Association, brought immediate and tangible benefits to local communities. The Association even began acting as a marketing agent for other local products, due to their established links to niche markets. Local participation was also encouraged with the development of a quota allocation system, where quota sizes for communities are correlated with their level of input and involvement in management activities (Vianna et al. 2004). After three years of managed harvest, both Arapaima populations and the harvest quota had increased substantially, thereby reinforcing local commitment to the management process.

When compared to the Brazilian project, the Guyana case demonstrates some significant differences. For one, Arapaima harvest in the area only begun in the 1960s, and even then it was introduced by outsiders and took a number of years to become common among the communities. As a result, the communities have had less than 50 years of knowledge and experience in Arapaima harvest. Local harvest was sold primarily on the Brazilian black market by middlemen, with little or no interaction between fishers and the market. The potential to develop niche markets in Guyana and Brazil was therefore impossible due to legal restrictions and the national ban. In addition, membership in the Fisheries Committees is a voluntary, unpaid position. Therefore, unlike the Mamirauá case, there is no economic feedback encouraging community participation. Also, rather than facing the clear and immediate threat of legal restrictions, as in the Brazilian case, the Arapaima harvest in Guyana declined over a period of approximately 35 years of commercial harvest. Ironically, Arapaima fishing was illegal in Guyana throughout this harvest period, but there was never any threat of enforcement. The communities therefore never faced an immediate "crisis", as in Brazil, with the Project emerging after the practical disappearance of Arapaima in the area. Many fishers also stated that they had moved on to other livelihood activities. As such, local interest in a management system among the

North Rupununi's Arapaima fishers may not have been as high as their Brazilian counterparts.

In sum, the origins of the two projects are strikingly different. In Brazil, the project was developed following a distinct crisis event; with management institutions emerging through learning and innovation; within the context of a strong Arapaima fishing culture. The project in Guyana emerged years after the collapse of the fishery; based on external institutional models; in communities without a strong Arapaima fishing culture. These cases demonstrate that the origins of a project and the context within which it emerges are just as, if not more, important to the project's success as is the transferral of lessons-learned. As such, a closer examination of how the North Rupununi Arapaima Management Project emerged is key to gaining insights into its performance.

5.3.2. Problem definition and external influence

The Arapaima Management Project emerged from the Iwokrama sponsored wildlife workshops in 1998, where community representatives identified Arapaima overharvest as a major local concern. However, following this issue definition phase, project development and mobilization was led primarily by Iwokrama and Mamirauá personnel. In particular, the Project's eventual development was heavily dependent on the decision by Iwokrama's Senior Wildlife Biologist to make Arapaima conservation and management a priority of the Centre's Wildlife Division. This decision, and the resulting commitment of time and resources by Iwokrama, was the catalytic element in the development of the Arapaima project. The project also benefited from Iwokrama's adoption of a community-based approach to resource management in the area, and the Centre's openness to the inclusion of local knowledge in research and management. This inclusive approach allowed the project to be structured around local institutions and knowledge, rather than focusing on western scientific approaches alone. When asked why the Centre's Wildlife Divisions adopted a community-based approach to wildlife management, a senior biologist replied "*Because it is the only approach that makes sense in the Rupununi*".

Although the Arapaima project was a response to local concerns, it is important to note that the state of local fisheries in general was also a major issue among North Rupununi communities. According to Iwokrama's report from the 1998 wildlife workshops, local participants identified the impacts of certain fishing techniques (gillnets, poisons) on local fisheries as a major concern. This concern for "food fish" was reiterated by community members throughout the research. It is therefore important to understand Iwokrama's decision to commit significant resources to Arapaima management, rather than general fisheries management.

Iwokrama's motives for supporting the Arapaima Project seem to be based on more than just responding to local concerns. On one hand, the Arapaima represents one of the region's charismatic megafauna, along with Black Caiman, Giant River Turtles and Giant Otters. The endangered status of these species, and Iwokrama's history of developing endangered species research and conservation programmes, seems to hint at a conservation leaning bias in the Centre's Wildlife Division. As such, the Arapaima management project may have benefited from Iwokrama support because it was more aligned with the Centre's endangered species conservation objectives. Conversely, the Project was designed to serve as a pilot initiative that could be used to create local management institutions, thereby increasing community organisation for future management of other species and natural resources. In fact, one of the Arapaima Management Plan's primary objectives is "to strengthen local community institutional structures". The comparatively high economic value of Arapaima meat, compared to other fish species, was also considered. An Arapaima project therefore had better potential to bring long term economic benefits to the community, which no doubt generated community interest and buy-in. As one villager put it, *"If you want to make Arapaima a business, you got to make it your business."* Whether driven by conservation objectives or practical consideration, Iwokrama's influence is evident in the transition from problem definition to action mobilization. I will explore this influence, and its impact on Project implementation, in the following sections.

5.3.3. The meaning of "community-based"

Although the Project emerged from local concerns over Arapaima stocks during the 1998 wildlife workshops, "local" in this case meant a few representatives from each community, many of which were not Arapaima fishers. These representatives seemed genuinely interested in the species conservation and the sustainability of the harvest. Also, they would arguably have more of a broader perspective of regional issues and sustainability, compared to local level fishers and community members. However, in the end they were not the individuals depending on the fish, or the persons who would eventually be tasked with implementing the project and management Plan. Instead of volunteering for the positions, most of the CFCs interviewed stated that they were asked by village leaders to be a CFC member. These individuals were therefore given the opportunity to be involved in a plan that offered future economic benefits and, not surprisingly, most accepted the position. The motives of the CFCs in agreeing to participate in the Project are debateable. However, it is clear these individuals were not the initiators or primary drivers of the Project.

In addition, the multi-community structure of the NRDDB often translates into region wide projects distributed equally among the member communities. This occurred in the Arapaima case, with the creation of 13 CFCs in all of the (then) 13 NRDDB member communities. Attempting to initiate a regional project, spread over thirteen communities rather than one, is quite a complex and ambitious endeavour, possibly too complex and ambitious to begin with. This multi-community approach requires significant investment of resources, and coordination between the individuals and institutions involved. One meeting participant commented on the size of the project, by saying *"We develop something (Project), but it not perfect. It like carving a alligator out of wood. It not going to be perfect, but we got to keep chopping away. Maybe we make a mistake and chop off it head. It is better if we start with a small alligator"*

Moreover, many of the communities are located a far distance from the rivers, and were not traditionally involved in Arapaima harvest. One CFC even said *"We in [name of community] never really catch Arapaima you know. We mostly catch them fine [small]*

fish in the creeks. Most people in the community never even see Arapaima." Again, the participation of communities in the project was based on the NRDDB 13 member template, rather than former involvement in the harvest.

However, this regional approach to projects is unavoidable, since one of the underlying tenets of the NRDDB is that benefits are distributed among the member communities. In addition, although Arapaima harvest may not have been important in a particular community, it only takes a strategically placed gillnet to catch an Arapaima. Therefore every local fisher is a potential Arapaima harvester. The Project can thus only be successful if residents of the region's communities recognise the harvest ban, and adhere to future quotas. As such, inclusion of all communities in the Project is a must in generating the required, regional level support and coordination.

Although unavoidable, the automatic inclusion of communities in the Project meant that factors such as level of interest, commitment, or even past involvement in the Arapaima harvest, were not factored in when identifying target communities. This contrasts significantly to the Mamirauá case, where it was often the fishers who approached the Institute, sometimes repeatedly, and actively sought their assistance in development a management system for Arapaima harvest in their area. A major difference between the projects therefore seems to be varying levels of local commitment and eagerness to be involved. Many respondents in the study alluded to the need for committed individuals for the CFCs to function. A number of responses were similar to this statement made by a local CFC:

"When you see the interested persons, you would be able to select (CFCs) again. To me the persons on the committee are not interested. Once you get the people who are interested it will happen. Then there are some people who always expect something, like money"

Even the establishment of checkpoints under the Conservation Contracts of Apoteri and Rewa was driven heavily by external forces. According to respondents, the original

Conservation Contract proposals submitted to Iwokrama by the two communities were focused on the management of lakes within the vicinity of the communities. However, following discussions with Iwokrama personnel, the communities revised their proposals to focus on the establishment of checkpoints. Associated Conservation Committees were created to implement and manage the check points, with the village councils appointing most individuals on the committee. I remember one conversation with a member of the Apoteri conservation committee which highlighted this point. He reflected that:

"Iwokrama came in and had this idea that it might be a good thing to have a checkpoint there, because people does be in and out. So that is what we did for our conservation contract."

"Whose idea was it"?

"The idea was theirs, they come in and put it towards village, and the village agree. The conservation committee was very active in the beginning, they were doing a lot of things. But it flop. The thing is the chairman too busy, you never see him. We need a new chairman, like [name given]. The checkpoints not functioning right now, the project flop. But we need to start it up again, and I feel would work. People used to stop, at the beginning they even had people weighing catch from people in community, and other people too"

Others respondents felt the checkpoints would be difficult to implement. A number of respondents made statement similar to *"The River too wide here, and some people pass night,"* or *"The checkpoints are a good thing you know, but we need a gun."* Again, the effect of delayed harvest and external influences in the development of these projects most likely played major roles in their current inactivity. However, as with the CFCs, many respondents suggested that in order to make the checkpoints successful, "*You need dedicated people...*"

Another issue central to the project's future success is local understanding of the plan. In terms of awareness among the communities, most respondents knew about the Arapaima project, the ban and the goal of eventually reopening harvest. However, I was struck by the general lack of understanding and awareness of the Plan's major aspects. For instance, in most interviews I asked whether the respondent was aware that only designated Arapaima fishers would be allowed to participate in the harvest. In many cases, even among some CFC members, the question was met with surprise. One CFC member, although aware of this aspect of the Plan, argued that "*I don't think people understand you know, because when I was registering*[1] *the fishermen, they were saying that once they are registered they can catch Arapaima...it would be a problem between Arapaima fisherman and non-Arapaima fishermen*".

Although meetings were held in these communities to explain the Plan, they were all one day sessions. It was intended that as a follow-up to these meetings, the CFC's would explain the major aspects of the Plan to local fishers. But it appears this has not occurred. One CFC member said "*I would say that they [the fishers] understand, but again not fully understand. You have to take time to explain to them over and over and then they would understand. If you go to them a day and just talk to them I don't think they would understand.*" These issues need to be addressed before harvest is attempted, since it creates the potential for confusion, and even conflict within the communities. This lack of a detailed understanding of the Plan also underscores the fact that communities were receptive of the Plan because of its perceived benefits, rather than being a primary driver in its structure and development.

5.4. Project implementation and social organisation

5.4.1. Resource enhancement as a starting point

By first focusing on stock recovery (the ban), the Project linked management actions with an increase in the resource base, and more secure livelihoods in the long run. Subsequently, local involvement in resource monitoring serving as a direct feedback loop

[1] The Project initially involved a fisher registration effort as a means of obtaining legally recognised fishery licenses. Although there was good coverage in particular communities, significant gaps remain and no licenses have been granted.

between community efforts and improvements in the resource state. This enabled them to directly observe the consequences of their actions, and arguably increase their support for future management interventions.

The project also seems to have developed more of a regional perspective to management among some fishers, with one respondent noting *"We did not see ourselves as catching too much. We used to only concentrate on people from other communities, saying these people coming from outside and we shouldn't allow them. But we never think about our self. Now we get to understand the need to conserve, that the goal on end is to harvest, and that is what people want."* This change in attitudes suggests that fishers have begun to recognise their shared responsibility for stock recovery, "...thus expressing their common stake in the maintenance of a healthy resource and the high priority such maintenance must have" (Pinkerton 1989:11)

A local role in stock recovery also places the community in a better position of negotiation with the Government, since it demonstrates their commitment to management and conservation of the resource. As Pinkerton (1989:09) puts it:

> "When fishers act as organised, self-disciplined group establishing principles for managing its own affairs, including some self-sacrifice, bureaucrats' resistance to sharing power and responsibility is necessarily reduced. Officials rationale for withholding power in these situations is seriously challenged and, if they remain entrenched in conventional stances, they may be shamed or manoeuvred into co-operation."

Stock recovery is therefore a useful starting point to involving local communities in management, and improving community-government relations. Unfortunately, it is clear that the Government in this case is motivated by more than a community-show of self-management; otherwise management responsibility would have already been transferred to local communities. I will examine these motivations in the following chapter.

5.4.2. Learning at the community level

In most cases, involvement in the Project seems to have positively affected the way project participants view resource management. As one villager said "*Well in real terms this [Arapaima project] was the thing that actually drive into me conservation. Throughout everybody had this idea of conserving, but what we were think of conserving, we were thinking more about preservation rather than conservation. But now that the management plan has come on stream people understand what conservation is really like, so that kind of driving things, and actually bringing up this whole idea of quota*".

This seems to have been the impetus behind the scoping out of a food-fish management plan by some members of the EFC. In referring to the plan, an EFC member and I discussed his vision for fisheries management in the region.

> *"I feel that it could have work in a way that one community helping another community and this community in turn helping that community. A help to help kind of relationship which would move toward kind of fish to fish trade. So that was the kind of thing that actually urge me to go into the direction of throwing it out. Like my idea was that they would have to drop the fish price because I can't drive in there [a community] for your fifty pounds and then bring it out here to sell it. So one of the thing coming out is how we do it and the only way we could see is that we might very well have to set up trade post rather than shops."*

So the idea of quotas is that because fish getting scarce or it was just...?

> *"That came up because the people in Apoteri and Rewa felt that people was going and bringing out too much of fish and they felt that it could decrease the population, so they thought that they should give quotas, so the question that we asked was, who they consider as a commercial fisherman, who is the fishermen, what should be the quota for going in fisherman, they give we the rate of what they think should be the quota that what we work with and their desire."*

This vision, although still in its early stages, borrow a number of ideas from the proposed Plan. For one, the idea of central collection points for fish is discussed in the Plan, along with quotas and the concept of defining and identifying specialized fishers who would be involved in the system. The definition of "commercial" fishers, quota systems, the EFC as a central marketing body, and a potential commercial tax was discussed at the EFC and community meetings in which I attended, with varying levels of enthusiasm. Although many of the communities were interested in getting into a "fish business", the idea of a tax was generally not well received. It was also apparent that the EFC has far to go in coordinating such an initiative, and may require additional organisational support. However, it was clear that, at least at the level of the EFC, the components of the Plan are being redefined and incorporated in early local attempts to address other fisheries related issues.

5.4.3. Individual commitment

It is also interesting to note that although the project is stalled, many individuals continue to function as community advocates for the Project and the ban. In addition, many of these individuals were not considered to be Arapaima fishers in many of their communities. For instance, more than half of the EFC are occupied by community leaders that were not heavily involved in the Arapaima harvest. This seems to be a common feature of many NRDDB projects, where a few individuals serve as the coordinators of projects that do not necessarily fall within their livelihood experience. The EFC chairman for example, who is primarily involved in local farming and serves as a Touchau and religious leader in his community, has also been a Community Environmental Worker, a member of the original Fisheries Task Force and currently serves as the vice chairman of the NRDDB.

The presence of a few core individuals in many of the NRDDB initiatives seems to be related to a shortage of local management capacity. As one fisher put it *"some people are not good fishermen, yet they are interested and can interact at this level"*. This point was eloquently hammered home during my focus group session when an EFC member

remarked *"You cannot put carpenter to catch fish, but that don't mean that a carpenter can't help manage the fish*". There are many carpenters in the EFC.

Although it is possible that these individuals are motivated by the power and prestige of these positions, they seemed to exhibit somewhat altruistic ideals. I remember having dinner with one such "carpenter", and asking him why he committed the time and energy to mostly unpaid positions, to which he responded *"I felt that getting into it would help to show that Amerindian people can actually manage, to help them to put that mark on the nation that the people are capable of managing, so putting those thing together and being a leader and not wanting to see it fail...and here I am working with this thing and this is not political. As a Christian I believe in conservation we believe in conservation, so all of these things put together the right kind of a scenario, and to earn a little income when so ever it come."* Similar motives were identified by other EFC members as their main incentive for being involved in the Project and linked community-based initiatives.

In many communities, reference was also made to some CFC members as *"...good men"*, meaning they were dedicated and reliable in their positions. These individuals continue to act as informal representatives for their communities at EFC meetings, and continue to act as information conduits between regional institutions and community members. In describing his commitment to the Project, one of these, often referred to, CFC members said *"[a young resident of the community] start working with Iwokrama, and he start talking about management, and I said to myself 'this youth can't tell me nothing'. Then after a while I get to realize it is something good he saying. So I went to a NRDDB meeting to see what it is, and it ended up being a fisheries meeting. So I write a application to join the project...Some people only work for the money. Other people like me, just like to do it. I want to do it."*

Community-based conservation projects and collaboration are more likely to develop if there is an "...energy centre: a dedicated person or core group who applies consistent pressure to advance the process" (Pinkerton 1989:29). From my interaction with the Project's "good men", I could not agree more. However, these individuals were few and

far between, and may need to be more empowered for their contribution to have a bigger impact on Project performance. This empowerment can take the form of reassigning individuals to leadership positions, as was suggested in some communities, in combination with capacity enhancing exercises. Capacity enhancement in the Arapaima Project involved training local fishers in the survey method. Many of the CEWs, and members of the fisheries committees also benefited from training under other NRDDB-Iwokrama programmes. In many of these programmes, training needs were through joint meetings with Iwokrama, the NRDDB and other community members. The resulting training programs seemed to be very situational and needs-based, particularly that of the CEWs. As one former CEW put it "*"I think it* [being a CEW] *was a learning something for me, because we do whatever we learn in our villages"*

Participants therefore developed skills that were practical and context specific. Some of the participating individuals have gone on to become influential in their communities, and key players in local conservation and development projects. Former CEWs, for example, have since been elected to village councils and Touchau positions. On such individual commented that *"We had training...particularly interpersonal, and leadership, and oral communication and them kind of thing. So that built my skills more, I have more confidence in me, and how to lead the people and them kind of thing"*.

It is important to note, however, that there is still a significant gap in local institutional and management capacity. Currently, management capacity is still very concentrated at the leadership level, and within particular families. As a result, many institutional and leadership positions are filled by the same pool of individuals, with persons stretched thin for time and energy. Local capacity, although on the increase, still continues to be a limiting factor in achieving true community-based natural resource management in the North Rupununi.

Interestingly, the individuals most often referred to as being reliable and dedicated were often the persons who visited Mamirauá Programme and experienced the project first hand. These individuals spoke of these experiences as major events in their lives, with

one saying "you really see how you can get things working with the project." These experiences therefore seem to offer additional insight into the source of the individual commitment observed. In this case, observing the benefits of a successful Project might have played a role in making the difference between commitment and ambivalence among some local project personnel. In the end, some CFCs may have to "see to believe" before they invest their time and commitment to the Project. Others may require more direct economic incentive. In this particular case, both "seeing" and economic incentive is dependent on the implementation of harvest. In the meanwhile, responsibility should be focused on key individuals that seem committed to seeing the Project through.

These key individuals at both the regional and community levels exhibit many of the qualities of "social entrepreneurs", which Bornstein (2004:01) terms "transformative forces". He describes these individuals as "...people with new ideas to address major problems who are relentless in the pursuit of their visions...", arguing that it will take these "...creative individuals with fixed determination and indomitable will to propel the innovation that society needs to tackle its toughest problems" Bornstein (2004:01,03). Although not the primary factor in Project development, this "social entrepreneurship" at the local level appears to have played a major role in the conservation of the Arapaima, and has given the Project a much needed lifeline while the Government considers its position. This leadership and altruism at the community level is clearly central to the Project's survival, and community-based management efforts in the North Rupununi.

5.4.4. Changed perceptions and social enforcement

With the rest of the project delayed, trained counters and Iwokrama scientists have continued to conduct annual population surveys, along with the training of additional fishers. This consistent activity seems to have given the initiative a sense of continuity for many villagers, and has helped maintain some level of community interest and support.

Of course, these counts can be subject to scepticism, with the inevitable question "If the fishers are the ones counting the fish, what is stopping them from inflating the numbers?" The potential for fishers to inflate numbers is a real possibility. However, this possibility

is reduced by the fact that the counts are conducted by a number of multi-community teams surveying different areas simultaneously. The results of the counts are only compiled following the survey and totalled to determine the regional population. As such, teams are unaware of the cumulative figure as they survey, and would be hard-pressed to coordinate a fraudulent total population estimate. Additionally, if numbers were inflated significantly by each team, the observed population increase would likely be more drastic than that observed. The presence of Iwokrama scientists during the count also decreases the chance of a premeditated miscount occurring. The legitimacy of the counts is also supported by overwhelming anecdotal accounts from community members supporting the growth of regional Arapaima populations.

Increased Arapaima populations suggest that, although other institutions have broken down in the absence of a harvest, the community ban is still holding and is contributing to the recovery of the species. How can the ban still be effective, if there are currently no formal institutions enforcing it? The study's respondents alluded to a number of reasons for the ban's strength, including a high diversity of alternative fish species and a lull in the markets. However, most villagers agreed that the two major drivers behind the ban is a change in attitudes due to the outreach campaign, coupled with the re-emergence of social sanctions for illegal harvesters (Table 5.1).

In the first case, the education and outreach program seems to have been the main contributing factor in the emergence of a new conservation ethic among the communities. This relied on a number of players, including Iwokrama, supportive community leaders, committed project personnel and Community Environmental Workers. Having the support and buy-in at the community level was critical, since the villages are small, and strong interpersonal relationships are a fundamental part of the local culture. Most respondents spoke of their initial concerns over the project and how they eventually came to support the initiative.

Table 5.1 – Community responses to the question "Why is the ban having an effect?" (n=39: see Table 3.1 for description of respondents)

Response*	Frequency
Change in attitudes	
People get to understand the need for the ban/conservation/project	11
Iwokrama/ Iwokrama workshops open our eyes/ wake us up	5
Want to leave them for next generations	4
People are more educated	2
Fear of penalty	
People afraid	5
People think that they will be reported	5
Everybody will know, and report you	2
More eyes watching	2
Economic benefit	
We will benefit from future harvest	7
It is good for tourism	2
Alternatives**	
We can catch other fish	10
We can do other things now (ecotourism, crab oil, honey, agriculture, bird trapping)	5
Other	
Amerindian people look to their leaders	1
Because of the ban, my mind just turn off of it now	1
I was not getting a good market	1
Unsure	1

*multiple responses allowed.
**response given primarily in combination with "fear of penalty" or "change in attitudes" responses.

In recalling one particular incident, a former Arapaima fisher said *"I hear Iwokrama coming to the community to stop everything, how they coming to talk to us. I really want to tell them something, because they can't stop the Amerindian way of life. But I shock how they talk sense when they come. Then I get to understand this conservation thing more better. How it really conserving for more generations."* Another well known Arapaima fisher from another community described his feelings on the Project, saying:

"The CFCs can work. We don't want Government to do it for us. Is we live among the resource, and we know where they are, we know which part they plenty and which part they little bit, so we have to manage it"

Why did you stop catching?

"If one person catch one, what will happen? Is 300 people here, that means 300 Arapaima would be gone in one month. Because I have 3 children, the youngest, he is 8 years, but he never see it [Arapaima], only he see it in a book. That is my main aim for my children, I want my children and grandchildren to benefit, more than 1 benefit."

Similar perceptions of project activities, and resource management in general, emerged as a common theme in many interviews and informal discussions. This seems to have had a positive impact on the project, with local support playing an important role in the continued local enforcement of the ban, as I argue in later sections. Being community members themselves, village leaders, local project personnel and CEWs were able to undertake in-situ education and awareness campaigns. They thus tapped into the informal, word of mouth communication network that shapes local attitudes and social norms.

Local participation in monitoring was also reinforced by the use of local knowledge in the development of the survey method, and the emphasis on community-based institutions like the CFCs and the EFC. The monitoring approach in particular served as a very effective entry point in building community support for the initiative. The

prominence of community members in monitoring has demystified management for many of the communities. They see their existing knowledge can play an important role in the management of their resources. This aspect of the initiative therefore seems to have been empowering for many of the individuals involved, while increasing local ownership of the survey findings and encouraging more support for future management interventions. As the primary actors in the monitoring programme, trained counters are also exposed to resource conditions at a regional scale. As a result, many seem to have gained more of a regional perspective on management and conservation.

Having local players involved in and supportive of the conservation efforts has significantly influenced social norms in most North Rupununi communities. The resulting social pressure to avoid arapaima harvest seems to play a larger role in enforcing the ban than the formal structures set up by the management plan (Table 5.1.). Three instances of harvest were identified during the research. In these cases, the harvester was reported to the EFC by both the local CEW, and other villagers. Visits to the individuals were then carried out by EFC members. In all cases, the catch was said to be accidental, and no penalty was enforced. However, most incidents resulted in a fair degree of gossip or *"talk name"*, and some ostracism of the offending individual. In another case, I witnessed the reaction of villagers to one former member of the EFC who was rumoured to have harvested three Arapaima juveniles for sale in Brazil. At one community meeting, he was approaching the gathering, and the meeting fell silent. As he sat down, some villagers moved away or turned their backs on him. When I later asked a community member what was the story behind his treatment, he said

"[name of individual] pass the checkpoint, and they ask him if he got Arapaima. He say no. But then he come at the landing to unload, and his ice box break. A man see the tails of the juveniles, and tell everybody. He went to Bon Fin [Brazilian town], and somebody say they see he was selling three juveniles. The Brazilians buy them expensive...so people vex [angry], because we not benefit, but he catch Arapaima."

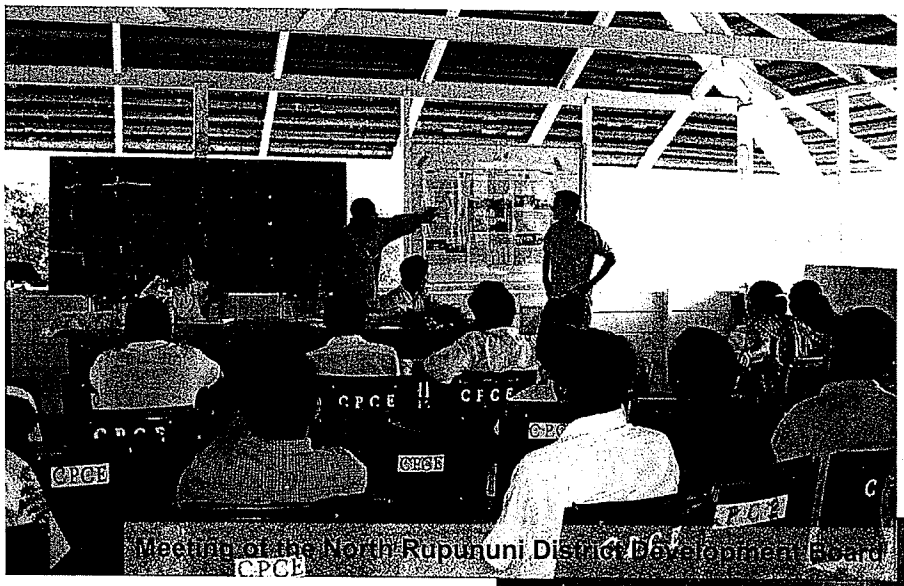
This story was related to me in most of the communities, with this individual mentioned by name. In all cases, opinions of him were quite negative, and were said to be directly related to the aforementioned incident. When I eventually spoke to him, his response regarding the incident was *"People just talking, talking, and they don't know what they talking about."* He offered no further explanation.

These incidents point to clear informal enforcement of the ban outside of the formal institutions of the CFCs and EFC. As many interviewees put it, "*More eyes watching to see if you catch Arapaima*". With these "invisible" social mechanisms working in favour of Arapaima conservation, it is not surprising that there is an apparent increase in community-level monitoring and social pressure to adhere to the ban. Interestingly, it was these same informal mechanisms of gossip and ostracism that were very operative during the taboo period, and now seem to be the key to the project's survival. As one EFC member put it, "*Fish management is our business. If somebody thief a cow, then Government got to get the police to do something. But fish management is our business.*"

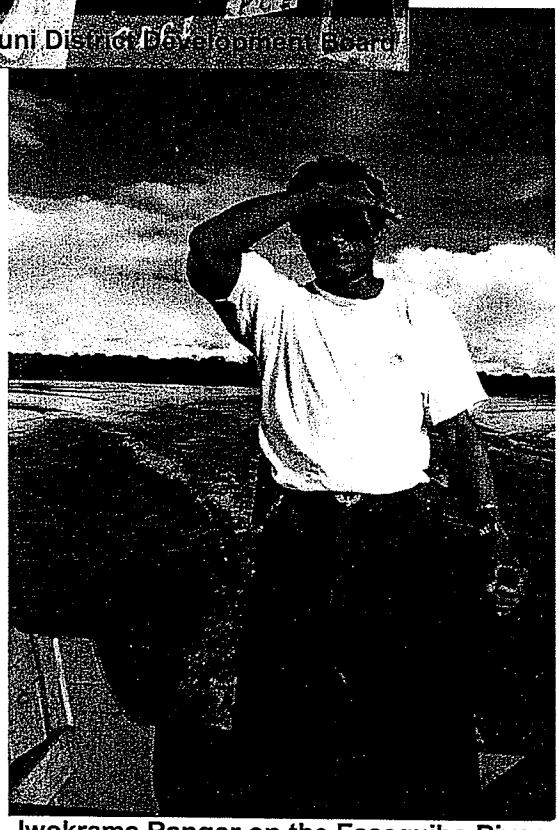
Therefore, what began as a somewhat top-down, externally driven project has become strongly dependent on bottom-up support. In the end, it is the change in community attitudes towards harvesting, combined with social enforcement of the ban, which has been the true success of the Project. These social mechanisms appear to be more effective than the formal management institutions (CFCs), and can be credited with the apparent increase in Arapaima numbers. The Project highlights that culturally sensitive environmental education and associated changes in social norms can play critical roles in conservation. This is important in situations where formal institutions are culturally inappropriate, non-functional, or slow to develop.

Chapter 6

Institutions, people and relationships: The role of cross-scale institutional linkages in community-based Arapaima management



Meeting of the North Rupununi District Development Board


Iwokrama Ranger on the Essequibo River

6.1. Introduction

In this chapter I examine the institutions and cross-scale institutional linkages that have both enabled and inhibited Project implementation. Linkages are taken to mean both formal and informal relationships, with a few examples being working partnerships, reporting structures, or even relationships between individuals, since institutional linkages often boil down to people linkages. I would also like to note here that institutional linkages are shaped by a superstructure of power relations between the institutions involved. For instance Iwokrama, with its high profile and access to funding, is much more powerful in interacting with Government than a community council, or even the NRDDB. This uneven distribution of power can determine who speaks, makes decisions, benefits, and even how they benefit, just to name a few. Further, these power relations exist at every scale, whether at the household or international level. These unequal power relationships also occur across these different scales, and ultimately come to bear at the local level. Therefore, any analysis of cross-scale institutional linkages must remain cognisant of these power dynamics, and their influence on both simple linkages and larger institutional networks.

This Chapter will first examine the institutional linkages leading up to the NRDDB's formation, and how those relationships created an environment conducive to the Arapaima project. I then focus on the key institutions involved in the Project's development, and the relationships that facilitated their involvement. This is followed by an analysis of the institutions created under the Project using Ostrom's (1990) design principles for common property institutions. This is used to identify and structure key issues in the functioning of these local management institutions. With key inhibiting and supporting linkages identified, the following section delves into the obstacles posed by weak linkages with Government. The chapter then concludes with an examination of the institutional linkages that appear to be keeping the project alive.

6.2. Laying the foundation

For most of the Makushi's presence in the North Rupununi, resource use seemed to have been subject to culturally embedded informal institutions. These included restrictions on

harvest of specific animals, including the Arapaima (MRU). Being embedded in Makushi culture, and enforced through social mechanisms, these institutions were active in all Makushi communities in the area. The utilization of the North Rupununi region's common property resources were thus matched by the regional scale of traditional management institutions. This matching of scales proved very effective at conserving the area's resources, with informal institutions persisting well into the late 1800s.

However, these institutions were not strong enough to withstand the effects of migration, acculturation and cash economies in the early 1900s. As traditions and local institutions began to fade, new regional level institutions were not developed to take their place. Without common rules and practices at this scale, it seems that "a get it while you can", individualistic approach to resource use developed in local communities. Laws were developed in an attempt to control resource use in the region, as in the National ban on Arapaima harvest, but were ineffective in the absence of supportive local-level enforcement structures. Furthermore, the few official representatives of these policies, local police and army, were themselves involved in the Arapaima harvest. This assuming of resource ownership by Government, without the development of associated management institutions, further undermined traditional stewardship of local resources.

The eventual overharvest of the region's Arapaima stock was therefore due primarily to a mismatch of scale. For one, a centralized Government had assumed ownership over the fishery, but lacked the resources and expertise to develop local level institutions for the management of this newly valuable species. On the other side, resource ownership was taken away from local communities, only to be replaced by distant laws and corrupt local law enforcement. With traditional stewardship undermined and market forces rapidly infiltrating the community, it was not long before classic open-access conditions emerged, leading to the collapse of the fishery.

The first step to regaining control over the fishery came with the establishment of the NRDDB. Like the cultural taboo, the Board was a regional level institution. As an institution, it could not match the efficacy of culturally embedded taboos, but it did allow

for collective decision-making and the development of management institutions on a scale. This scale was much more closely matched to many regional resources, including the Arapaima, than Governmental laws and policies. An addition benefit of the NRDDB was that it facilitated the consolidation of the region's human and financial resources. As a result, the capacity and power of the NRDDB to negotiate with external groups was arguably greater than that of individual communities. The creation of the NRDDB was thus a key step in facilitating a working partnership between Iwokrama and the communities of the North Rupununi.

The creation of Iwokrama, with its emphasis on community development and participation, served as the primary catalyst in the NRDDB's creation. Iwokrama played a dual role in the Board's development, initially as the perceived threat driving community organisation, and later as the NRDDB's primary partner institution. With communities up in arms over Iwokrama's creation, the Centre needed to quickly address local fears and negative perceptions before it could create a working relationship with local communities. For one, it revised its list of target communities to bring it more in line with the NRDDB membership. The Centre also acted as a conduit for the funding that facilitated initial community meetings, including those that led to the NRDDB's formation. In addition, Iwokrama engaged community representatives through a number of meetings and workshops focused on identifying local concerns and issues. These concerns often formed the basis of joint Iwokrama-NRDDB project, with Iwokrama being the primary source or linkage to financial resources and supportive expertise. Iwokrama also facilitated a number of programmes that strengthened its relationship with the NRDDB and local communities. These included the Community Environmental Workers, Iwokrama Forest Rangers, and Conservation Contracts. The Centre even funded an extra day at the NRDDB's bi-monthly meetings to present and discuss Iwokrama related issues and projects.

Aside from being an important source of financial and human resources, and organisational support, Iwokrama also acts as a key linkage organisation between donor groups, Government, the NRDDB, and local communities. Iwokrama has been able to

draw on its legitimacy with the Guyana Government and visibility at the international level in negotiating with both the State and supportive organisations and groups. For instance, in recognizing the Board as the formal representative of the North Rupununi communities, Iwokrama brought national and international attention to the NRDDB and community issues. This no doubt also increased the legitimacy of the Board at many levels; locally, nationally and internationally. In 2002, this recognition was formalized with the appointment of a representative from the North Rupununi communities to Iwokrama's International Board of Trustees.

Conservation and development initiatives, in the North Rupununi, including the Arapaima project, have been based primarily on the two-way core linkage between Iwokrama and the NRDDB. Initially, this relationship involved two organisations, each representing constituencies at different scales, working primarily through each other to access the other's constituencies (Figure 6.1). This relationship has however grown into a much more complex "network" (Figure 6.2) similar to that described by Carlsson and Berkes (2005). This is due to the NRDDB increasingly being able to establish and maintain relationships with outside groups independent of Iwokrama. The institutional linkages leading to the development of the Arapaima project represents a subset of this larger network.

6.3. Project development

By bringing human and financial resources to local concerns, Iwokrama facilitated a shift in how wildlife management is conducted in the North Rupununi. Rather than the usual centralized, command and control approach of the Government, Iwokrama facilitated a number of participatory forums and focused more on partnership-based processes.

According to Watkins et al. (1999:06), Iwokrama saw its role in developing community-based management in the North Rupununi as undertaking *"...applied research on wildlife to aid management and to help facilitate the necessary meetings and discussions between the primary stakeholders, Government agencies and local communities."* The Centre certainly assumed this role in the development of the Arapaima project.

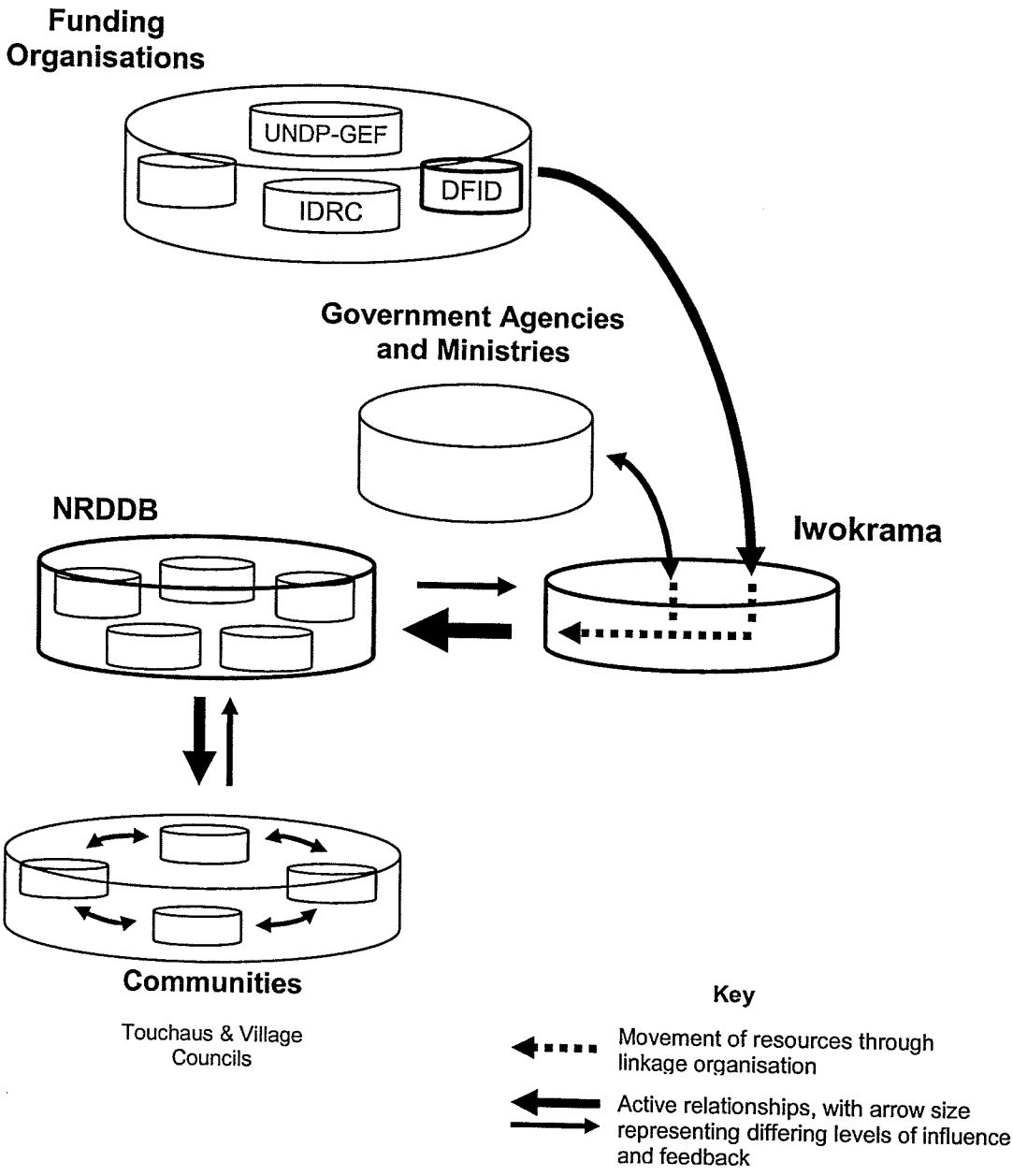


Figure 6.1 - Institutional linkages facilitating North Rupununi District Development Board and Iwokrama Centre projects (immediately following NRDDB's creation).

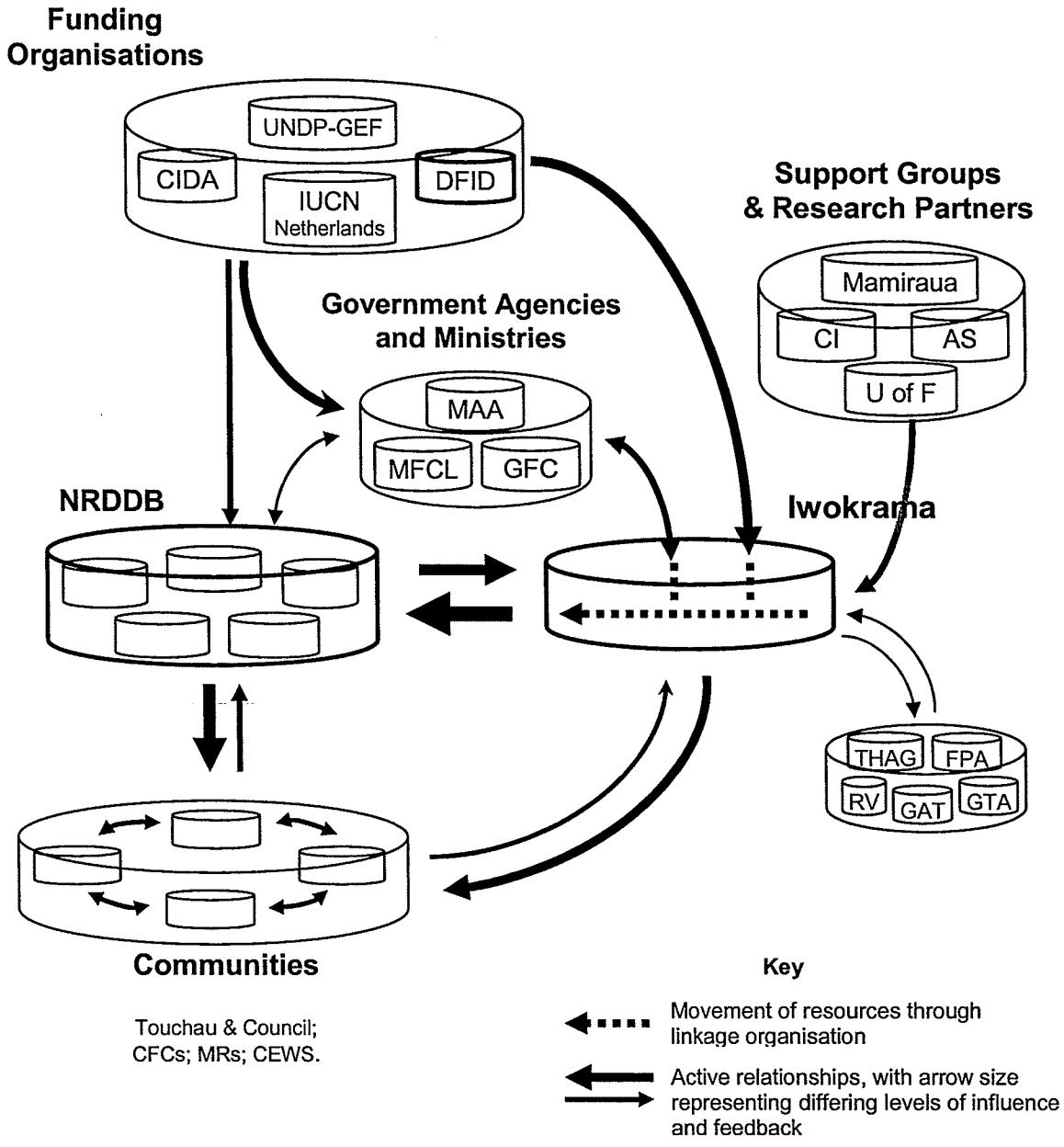


Figure 6.2 - Institutional linkages facilitating North Rupununi District Development Board and Iwokrama Centre projects (2003).

Figure 6.2 (continued) – Description of Institutions and their role in NRDDB-Iwokrama projects

Group	Full Name	Contribution
Funding Agencies*		
UNDP – GEF	Global Environment Facility – United Nations Development Program	Institutional development, institutional set up, and resource surveys for Iwokrama Forest
DFID	Department for International Development	Senior Iwokrama staff support, sustainable human development, training, and community development
CIDA	Canadian International Development Agency	Institutional development, administration, community based tourism, and ecotourism internships
IUCN – Netherlands	Wildlife Conservation union - Netherlands committee	Aquarium fish trade; Bina Hill Institute
Government		
MAA	Ministry of Amerindian Affairs,	Community institutional development, Iwokrama Board of Trustees
MFCL	Ministry of Fisheries Crops and Livestock	Primary link through MOU with Iwokrama.
GFC	Guyana Forestry Commission	Primary link through MOU with Iwokrama.
Other Groups*		
Mamirauá	Mamirauá Institute For Sustainable Development	Arapaima fisheries management
CI	Conservation International	Iwokrama ranger training
AS	Audubon Society: Latin America:	Youth training in School Yard Ecology and "Cycle of Inquiry" (simple approach to scientific research)
U of F	University of Florida	Agricultural research and development
Private Sector		
THAG	Tourism and Hospitality Association of Guyana	Partners in tourism development
GTA	Guyana Tourism Authority	Partners in tourism development
GAT	Guyana Aquarium Traders	Partners in Aquarium trade development
RV	Rock View	Partners in tourism, agricultural development
FPA	Forestry Producers Association	Partners in timber development
Communities		
Touchau, Village council		Village level governance
CFC	Community Fisheries Committee members	Enforcement of Arapaima Management Plan and monitoring fishing activity
MR	Makushi Researchers – Makushi Researcher Unit	Conduct ethnobiological research
CEW	Community Environmental Workers	Environmental education and awareness in communities

*** includes only a selection of the total number of partners involved**

The relationship between Iwokrama and the NRDDB thus facilitated a number of meetings and forums, which, as previously mentioned, allowed for the identification of local concerns and issues. The Arapaima project for instance, grew out of local concerns over Arapaima stocks during wildlife workshops between Iwokrama and the communities in 1998. However, following these meetings, the project's development was led primarily by Iwokrama. It was through this organisation that links were established with Mamirauá programme and funding sources.

It was through the Iwokrama Centre-Mamirauá Institute relationship that the Arapaima project really took shape. Both organisations worked at similar levels in their respective countries, with parallel mandates that integrated conservation and development. They each functioned as linkage institutions between communities, governments and international agencies. The difference in the Brazilian case is that the organisation had been in existence for a longer time and had more years of experience and learning. By establishing a relationship with Mamirauá, Iwokrama was able to access this learning and expertise, and tap into Mamirauá's larger institutional network.

With Mamirauá involved, Iwokrama was linked into a totally new institutional network in Brazil (Figure 6.3). This included Brazilian fishers with the knowledge of how to count Arapaima, and on whose knowledge the Arapaima survey methodology was based. Then there was the Mamirauá Institute itself, who had been working with local communities since the early 1990s. This Institute had benefited from the expertise of a multidisciplinary collection of scientists, including social scientists, biologists, ecologists and economists (Castello pers com. 2005).

In particular, they had pioneered a community-based Arapaima management system in local communities that appeared to be biologically sustainable, while at the same time generating significant socio-economic benefits for the communities involved. The Mamirauá link also gave Iwokrama access to the Institute's international partners, such as the Wildlife Conservation Society.

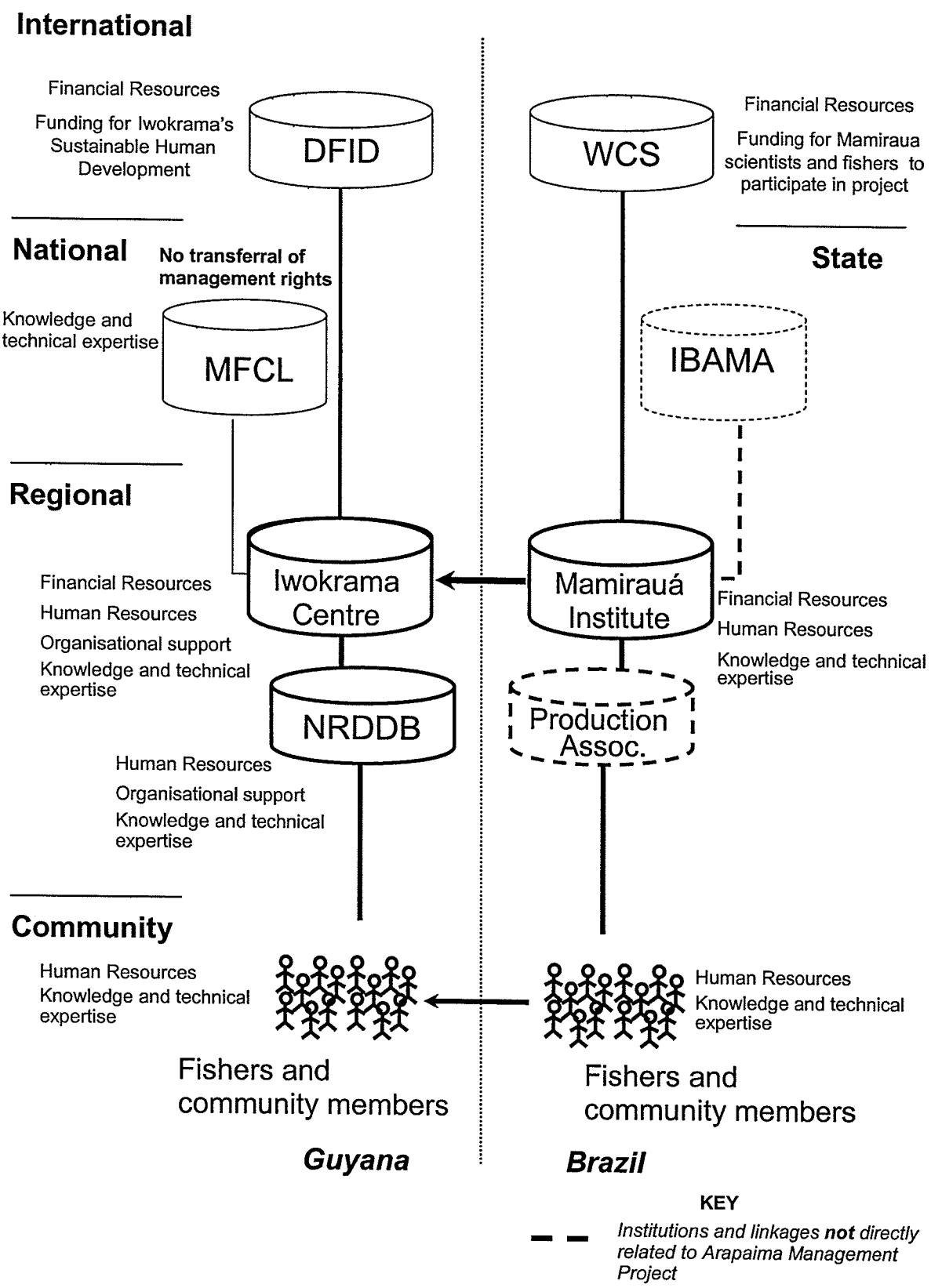


Figure 6.3 – Institutional network that facilitated the *development* of the Arapaima Management Project (resource contributions relate solely to the Project).

Figure 6.3 (continued) – Institutions that facilitated the development of the Arapaima Management Project.

Institution	Full Name
DFID	Department for International Development
IBAMA	Brazilian Institute for the Environment and for Natural Renewable Resources
Iwokrama Centre	Iwokrama International Centre for Rainforest Conservation and Development
Mamirauá Institute	Mamirauá Institute For Sustainable Development
MFCL	Ministry of Fisheries Crops and Livestock
NRDDB	North Rupununi District Development Board
Production Assoc.	Association of Producers of the Jarauá Sector
WCS	Wildlife Conservation Society

This relationship first facilitated the transfer of knowledge and expertise between the local level fishers, through visits by North Rupununi fishers and an Iwokrama scientist to the Mamirauá Programme in Brazil. Further, and more formalized linkages were then built on this initial exchange, leading to considerable transfer of technical expertise and capacity building that eventually led to the development of the Management Plan. For one, Mamirauá was able to access funding from WCS to support the activities and salaries involved in the development of the Arapaima project. It was also through the Institute that Brazilian Arapaima counters were brought to Guyana to instruct the Guyanese trainees in the survey methodology.

The Mamirauá link also facilitated the dedication of a Mamirauá scientist to the process of developing the areas Management Plan. This individual was the primary scientist involved in the development of the counting method in Mamirauá, and was involved in the Institute's community-based Arapaima management efforts. He initially participated in the Iwokrama funded fisheries workshop in 2000, and subsequently led the 2001 training workshop in Guyana. He also participated in both of the North Rupununi surveys in 2001, and was the lead individual in subsequent regional and community meetings leading to the Management Plan's development. He prepared most of the draft Plans, and met with Government agencies to present the Plan and discuss any issues or concerns.

Although there was significant external knowledge and expertise driving the development of the Arapaima project, local knowledge and institutions also played a key role. The NRDDB, in particular, provided the institutional base for the coordination of project activities, without which the project would probably have never gotten off the ground. NRDDB members often dedicated both time and effort to Project development, often facilitating meetings between Project scientists and community members, and promoting the Project and ban in their respective communities. Local expertise also contributed to the shaping of certain aspects of the plan, including the selection of individuals constituting the CFCs, logistical issues in coordinating counts and future harvest, distribution of quotas and enforcement mechanisms. The multi-community structure of the NRDDB also had a major impact in shaping the form of project related institutions.

For instance, Community Fisheries Committees are absent in the Brazilian project, but was identified as a critical institution in legitimising the EFC's ability to represent fishers in thirteen communities. Even the 'untrained' fishers brought critical local knowledge and skills to the project; as the Iwokrama scientist said *"The knowledge was there..."*

6.4. Project implementation

6.4.1. Crafting local management institutions

Two institutional structures were created specifically for the implementation of the Arapaima Management Plan. These institutions were the local-level Community Fishery Committees and the regional Executive Fisheries Committee. The Management Plan describes the functions of these institutions and outlines an organisational scheme in which these local institutions interact in different ways with other institutions at different scales. Executive Fishery Committee will represent the interests of the Community Fishery Committees, which in turn, will represent the interests of the fishers from all the communities. Decisions on issues pertaining to participating fishers, harvest activities, quota sizes and distribution, and marketing to name a few, will be made by the Fisheries committees, with the NRDDB and Iwokrama providing organisational support and technical advice. Major decisions, as in quota sizes, will first be cleared with the Ministry of Fisheries Crops and Livestock (MFCL), which will retain final decision-making power. There are also two positions available on the EFC for representatives from the Department of Fisheries within the MFCL. The Plan also describes a number of reporting structures linking CFCs, EFCs, the NRDDB, Iwokrama and supportive Government Agencies.

In describing robust common pool resource institutions, Ostrom (1990) argued that the nesting of local institutions into a broader cross-scale network of institutions helps to ensure that larger and small-scale problems are addressed. Although true in many cases, this statement is based on the assumption that individual institutions, and the linkages between them, are functioning appropriately. This is clearly not the case in the Arapaima Project. Therefore, in order to analyze key cross-scale institutional linkages in the

Project's implementation, we must first examine the "robustness" of the institutions designed to manage the common pool resource that is the Arapaima.

In examining the Project's management institutions, it may be useful to use the framework described by Ostrom (1990), which identifies a series of design principles that characterize robust, common pool resource institutions. Many of these principles have been discussed in earlier chapters, but are consolidated here using the framework to gain further insights into the performance of Project's institutions. Under each principle, the analysis will compare how these institutions are supposed to perform under the Plan, with how they appeared to be functioning during the study.

Ostrom's design principles for robust common-pool resource management institutions include:

1. *Clearly Defined Boundaries*

The boundaries of the management area are defined in the AMP (See Figure 4.3) However, the resource system in this case is a mobile fish stock, which can move outside of the management area and be subject to harvest in these outside areas.

2. *Proportional Equivalence between Benefits and Costs*

"When decisions are considered fair, there is less chance that the resource users will try to challenge, avoid, or disrupt..." the rules and management institutions (Anderies et al. 2003:15). The AMP stipulates that only Arapaima fishers (those who have harvested over 500 Arapaima) should be allowed to fish and thus benefit directly. The catch will be sold to the EFC, who will then market the catch, with profits going to project costs. There is also an assumption of regional level indirect benefits through reinvestment of profits into additional community projects. So far, former Arapaima fishers who serve as CFC members have borne most of the project related costs, due to the ban and their involvement in the Committees. That said, many general fishers who have the capacity to harvest Arapaima have also felt the costs of the ban, albeit to a lesser extent. Counters are paid for their time. It is still unclear what benefits will offset the costs of non-harvesting

CFC and EFC members who are expected to dedicate their time to the management of the Project. This lack of benefits is no doubt the primary factor leading to CFC inactivity.

3. *Collective-Choice Arrangements*

Ostrom (1990:90) argues that for common pool management institutions to be effective, "Most individuals affected by harvesting and protection rules are included in the group who can modify these rules." In the case of the Arapaima management project, most decisions are supposed to be made through committee structures at various levels – CFC's in community, EFC at regional level and NRDDB as the umbrella regional organisation. The primary rules of project are articulated and formalized in the Arapaima Management Plan. However, it seems that many of these rules and structures are based on the Brazilian case. It is unclear how involved local Arapaima fishers were in defining some of the rules, but it is apparent that many respondents are unaware of, or do not understand, many of the Plan's harvest related rules. During the course of the study, respondents raised concerns over the plan's definition of an Arapaima fisher, the methods prescribed for harvest and the restriction of harvest activities to only Arapaima fishers. This lack of awareness must be addressed if harvesting is to be effectively managed in the long term, since "...rules that most of the resource users themselves establish are better known, understood, and perceived as being legitimate" (Anderies et al. 2003:15).

4. *Monitoring*

In this instance, those involved in monitoring are mostly former Arapaima fishers from all of the thirteen communities. The monitoring method is also based on local knowledge. Since 2001, surveys have been conducted annually by trained local counters, showing an increase of 775 adult and juvenile Arapaima within the management area. Monitoring of fishing activities continues to be the responsibility of Fishery Committee members. Although, the committees are inactive, certain individual continue to function in monitoring. In addition, there seems to be community-level informal monitoring through mechanisms such as gossip.

5. *Graduated Sanctions*

Graduated sanctions are not only necessary as a deterrence mechanism, but they also "...preserve a sense of fairness by allowing flexible punishment when there is disagreement about rule infractions. Without these mechanisms the incentives to overharvest and free ride may again dominate strategic behaviour" (Anderies et al. 2003:15)

Although Arapaima harvest is illegal, there is no formal government enforcement. Adherence to the ban has therefore been mostly voluntary. According to the AMP, Fishery Committees are responsible for enforcing the rules. The Plan goes further in suggesting four steps to be taken in the event of illegal harvesting, including:

"A. To talk and convince the offender to stop breaking the rules; if that doesn't work, the person should be taken to the Executive Fishery Committee. The Executive Fishery Committee should proceed according to the advice given by the Ministry of Fisheries, Crops and Livestock;

B. To use community radios to alert about fishermen breaking the rules or to call for help

C. In the case of fishermen from another community illegally fishing; conduct recommendation number one and also report to the other village's Community Fishery Committee and the Executive Fishery Committee. The Executive Fishery Committee should proceed according to the advice given by the Ministry of Fisheries, Crops, and Livestock;

D. In the case of fishermen from outside NRDDB communities fishing illegally; conduct recommendation A and report to Executive Fishery Committee. The Executive Fishery Committee should proceed according to the advice given by the Ministry of Fisheries, Crops, and Livestock".

Three instances of harvest were identified during the research. In these cases, the harvester was reported to the EFC by both the local CEW, and other villagers. EFC members then carried out visits to the individuals. In all cases, the catch was said to be

accidental, and no formal penalty was imposed. However, most incidents resulted in a fair degree of gossip or "*talk name*" in the community and some level of ostracism. For now these mechanisms appear to be working, however, it is unclear how effective this social pressure will be in the long run, particularly if it is challenged by outside harvesters. A number of respondents emphasised the need for more enforcement of formal sanctions and *"punishment"*.

6. *Conflict-Resolution Mechanisms*

Even when rules may be well articulated, conflicts can occur as to their interpretation. As such there needs to be regular access to "...low cost and rapid conflict resolution mechanisms mediate this internal noise in the system by reinforcing, the common understanding about what rules mean" (Anderies et al. 2003:15).

The institutions involved in the project are meant to provide forums for conflict resolution at various levels. In addition, members of the communities, CFCs or the EFC can raise their concerns at the NRDDB meeting either in written form, in person or through a representative. In some cases concerns are raised directly to Iwokrama personnel, who may then present these concerns to the individual(s) in question, or at the NRDDB meeting. A few villagers felt that NRDDB meetings do not foster input from *'ordinary people'*. Since there has not been much Project related activities, it is not clear how these institutions would cope with conflicts once harvest begins.

7. *Minimal Recognition of Rights to Organize*

Without long-term tenure rights to the resource, users cannot prevent those who want to evade management institutions from claiming that these institutions lack legitimacy. Without ownership, whether *de facto* or *de jure*, there is no direct incentive for resource users to manage the resource, particularly if challenged by outside users. In these instances, the temptation to overharvest from the resource and free ride is often great, ultimately leading to Hardin's (1968) tragedy of the commons and the collapse of the resource.

According to the Management Plan, the Project should be implemented by the Fisheries Committees, under the supervision of the Ministry of Fisheries Crops and Livestock, with support from three additional Governmental Ministries. Provisions are also made to include two representatives from the MFCL on the Executive Fishery Committee.

In the development of the Arapaima management project, the rights of community members to devise their own institutions were not challenged by the State; rather the Governmental representatives involved in the project supported them. However, the fundamental hurdle in implementing the project is the inability of communities to secure long-term tenure rights to the resource. Without the State sanctioning of the Project, Arapaima harvest is still illegal, and resource ownership and management responsibility rests solely with the Government. The securing of ownership, or at the very least management rights, by NRDDB communities is an issue that involves institutional linkages at different organisational scales, and has be addressed as such, as I will discuss in the next section.

8. *Nested Enterprises*

Project institutions and activities can be classified as multiple layers of nested enterprises. The CFCs were designed to focus on fisheries issues at the community level, while the EFC is tasked with the coordination of regional fisheries management. Both of these institutions fall under the regional umbrella of the NRDDB. The NRDDB in turn is the primary link to Iwokrama, another regional level institution, and the central Government agencies. The NRDDB, both individually and through Iwokrama, also maintains links with international research and funding agencies.

It is clear that there are fundamental structural issues which may be undermining the functioning of formal management institutions. However, many of these issues relate to higher level institutional linkages, or lack there of. In terms of the Arapaima Project, the lack of effective linkages with Government has implications on all eight principles of local management institutions. For instance, the absence of Governmental support for harvesting and associated activities remains a major obstacle, particularly since local

institutions, like the EFC and CFCs, were developed primarily to manage harvest. A fair assessment of these structures may therefore be impossible until harvesting begins. It is clear however, that these institutions need to be rebuilt before managed Arapaima harvesting can be attempted in the North Rupununi. The previous institutional analysis begins to identify issues that would need to be addressed in the revival of these institutions.

The analysis also highlights major institutional linkages that seem to be inhibiting and/or facilitating different aspects of the Project. The following sections will further examine these linkages and their effect on the Project's larger institutional network.

6.4.2. Barriers, linkages and institutions

The primary factor undermining local institutions and Project implementation is Governmental inaction on policy and co-management arrangements. It is therefore important to examine the institutional linkages between local organisations, Iwokrama and the Government if this barrier is to be addressed. Again, examining the institution, in this case the Ministry of Fisheries Crops and Livestock, is key to gaining insights into how it interacts with the Project's larger institutional network.

The fishing industry represents a relatively small portion of Guyana's GDP, when compared with the agriculture, timber and mining industries. This lower profile is somewhat reflected in the subordination of the Fisheries Department within the Ministry of Fisheries, Crops and Livestock (MFCL). The low priority given to many Fisheries Departments is often cited as the root cause for poor administrative performance of these institutions (Marriott 1990). Marriott (1997) argues that when State fisheries institutions are subordinate within larger institutional structures, the "*the institution develops and acquires, in time, other tasks and functions and in so doing begins to lose sight of its essential function...*" He suggests that this often leads to an obscuring of the fundamental purpose of the ministry, which in the end compromises institutional integrity. This phenomenon is further exacerbated by the classic hierarchical organisation of State institutions. These organisations are often slow to react and find change difficult, thus

creating an environment which does not foster initiative (Marriott 1997). In the end, these institutions often tend to become overly bureaucratic, as the importance of its primary responsibilities is sidelined by the importance of administration for its own sake. This appears to be the case in Guyana, where the broad mandate of the MFCL most certainly stretches its already limited resources.

With little resources, and a broad mandate, the MFCL seems to be showing signs of *"compromised institutional integrity"*. For one, it was the general consensus that inland fisheries, due to their local economic importance, receive less Governmental attention than coastal fisheries. Staff reshuffling and turn-over rates are also high, leading to little institutional memory. The fisheries officer delegated to liaise with the Project had occupied her position for only a few months at the time of the study. In addition, she was the sole fisheries officer dedicated to inland fisheries, and therefore was responsible for a number of activities, all taking away from her involvement with the Project. This level of staff turnover and individual work loads also means that individual relationships and trust between the Government and project personnel have to be continually re-established.

The Ministry is also very centralized. There are no fisheries extension officers based outside of the developed coastal strip. There is also no precedence for co-management agreements between the Ministry and any non-governmental group. This suggests that the Ministry may be unwilling to delegate management authority to a sub-agency, because of the political importance attached to the ownership and management roles. Most of the policy decisions, particularly relating to delegation of management authority, are made by the Minister. Without the delegation of management authority to North Rupununi institutions, the Project's institutional arrangements and linkages can not effectively function. Therefore, the lack of political will at senior levels in the Ministry seems to be the primary obstacle in the full implementation of the Arapaima management project.

The ability of Iwokrama and the NRDDB to engage senior officials at the MFCL, is therefore critical in establishing the institutional linkages required for Project implementation. Iwokrama was able to use its status as an international NGO to engage

Ministry officials during the project's early stages, particularly in the development of the Management Plan. Ministry representatives were key in identifying key aspects of legislature that allowed for the proposed managed harvest of the Arapaima. Iwokrama was also successful in facilitating meetings between Government representatives and Mamirauá scientist and NRDDB representatives to present the Management Plan to various Ministries, including MFCL. However, Iwokrama's influence was not sufficient to stimulate Government action on the required policy changes.

According to Bryant and Bailey (1997) Iwokrama type NGOs often use four main techniques to exert their political influence. They may attempt to influence the development of environmental policies and practices of the state, businesses and multilateral institutions. Another approach can involve direct or indirect support and empowerment of grassroots attempts at conservation and development. A third avenue of influence is through education and awareness campaigns aimed at increasing the public's awareness of environmental and development issues. Finally, NGOs attempt to increase the international visibility of their work by pushing their agendas at global conferences and similar forum.

Iwokrama and the NRDDB used a number of these techniques in attempting to gain support from the MFCL for the Arapaima Project. They tried to push for policy changes that would allow for co-management arrangements; they issued a press release in the local media describing the Arapaima project and the need for community involvement and Governmental support; a number of conference papers and presentations by Iwokrama have also highlighted the Arapaima project as one of the organisations important accomplishments. In recognizing the NRDDB's legitimacy, and supporting its development with human and financial resources, Iwokrama has empowered local institutions and increased the NRDDB's power in dealing with Government and other outside actors. By increasing the power of once marginal actors, Iwokrama made a highly political intervention that most likely influenced its relationships with other actors.

The Arapaima project was the NRDDB's first attempt at engaging the Government in a co-management agreement, and although the aforementioned techniques were employed, in the end they have not been effective. This was no doubt due to other factors such as the low priority of the fishery, weak institutional memory, and resistance to the transfer of management rights to local communities. However, the weakness of the Iwokrama-NRDDB-State linkage in relation to the project may also be related to apparent shortcomings in attempts to engage Government. For instance, it was the Mamirauá scientist, a foreigner, who led the presentation of the project plan in meeting with the Government agencies. These meetings were often, one off events, where the representatives agreed to the Plan in principle. In many cases, the Minister, who had the final say, was absent during the meetings. Following these meetings, the Mamirauá scientist left Guyana and has not had any involvement in the Project since. His departure not only meant the loss of technical expertise, but it also weakened the linkage between the project and Government, since institutional relationships are often based on relationships between individuals.

It can therefore be argued that the lack of sustained dialogue, and negotiation between project personnel and Ministry officials may have undermined institutional linkages with Government. Even the Mamirauá scientist admits that they may not have communicated effectively and lobbied the Government sufficiently for the Project approval. The benefits of collaboration therefore need to be clearly and persistently presented to Government in negotiations.

6.4.3. Government and the Project: bridging the divide

Both Iwokrama and the NRDDB need to revisit their approach to engaging the Government. One of the major issues raised by Government representatives in 2002 meetings with Project personnel was the scientific validity of the survey method (Castello pers com 2005). Although these questions were addressed at the time, a recent communication between Iwokrama personnel and the MFCL revealed that Ministry officials still had doubts about the Arapaima counts. This scepticism was also encountered in the Brazil, where officials from Amazonas State IBAMA office (Brazil's

Environmental Protection Agency) responded to Mamirauá's endorsement of the counting method as "proposing strange ideas" (Castello pers com 2005). In response, the Mamirauá Institute invited IBAMA officials to the Mamirauá Reserve, where they met the fishers and observed the Arapaima counting first hand. According to Castello, negotiations between the project and the Government following this exercise were greatly improved. Iwokrama did attempt to build relationships between the communities and Government by inviting officials to participate in the series of meetings in the late 1990s and early 2000s. This met with some success at the individual level, with one Government official stating that *"Involvement with Iwokrama changed the way I look at co-management. It has broadened my perspective greatly and exposed me to ideas, and an appreciation of how fisheries could be successfully co-managed."* However, these Government officials were not the primary decision-makers, and in the end failed to effect much change in Government policy towards the Project. These officials also never observed the counts directly.

Increasing State confidence in the counts, and community-based monitoring in general, may be encouraged by a show of local commitment to stock recovery, and increased interaction between Government officials and community members. With stock recovery already documented, Project efforts must now shift towards "...'hands-on' experience for bureaucrats to work effectively with fishermen, and the difficulty of maintaining co-operative relations if bureaucrats have not had this experience" (Pinkerton 1989:25). It may therefore be useful to engage governmental decision-makers (Minister of FCL) by facilitating visits of these officials to the North Rupununi. By observing the surveys first hand, officials may be more open to accepting the survey methodology. In addition, these visits will allow for relationship building between individuals from the State and community levels, which can in turn encourage a change in Government perceptions of the Project, and a Ministry that is more responsive to community collaboration in the future.

Iwokrama and the NRDDB may also need to increase the visibility of the Project at the national level. This can be accomplished through a renewed education campaign aimed at

increasing the public's awareness of the Project. Press releases can be used to show Arapaima stock recovery and argue local commitment, thus highlighting the State's role (or lack there of) in Project implementation and putting indirect pressure on the Government. Efforts can also me made to increase the international visibility of the Project by pushing the initiative at global conferences and similar forum. Increased international visibility would potentially create opportunities to align the Project with influential donors and external groups (such as the Caribbean Fisheries Unit of the Caribbean Community (CARICOM) of which Guyana is a member) that may be able to exert political pressure on the Government.

Finally, and most importantly, resources should be invested into directly engaging Governmental decisions-makers. Structured meetings should be facilitated between Project personnel and Government officials to re-open dialogue concerning the Project. Aside from strengthening relationships, these forums should have the clear objective of addressing Project-related Government concerns and establishing clear prerequisites for the transfer of management authorities to the communities. These prerequisites need to be documented, assigned a time-line and, if possible, formalized in an agreement. This must be combined with a revamping of the local management institutions; the CFCs in particular (see table 4.1 for Project related recommendations).

The lack of effective negotiation with Government also underscores a much more fundamental issue of gaps in the training and experience of many biologists and conservationists involved in the Project, and conservation projects in general. Many of the scientists involved in conservation and development projects are from scientific disciplines that primarily focus on training and education related to those particular disciplines. It is true that more "multidisciplinary" programmes have come into vogue recently, as scientists recognise the complexity of conservation and development issues. However, in this case at least, there still seems to be major gaps in the training of scientists and Project personnel, particularly when it comes to communication and negotiation within the political sphere.

As such, project personnel require a fair understanding and working knowledge of policy issues, politics and communication if they are to establish institutional linkages that support community-based initiatives. They most also remain cognisant of their own roles and positions within this political milieu. Without these skills, it is often difficult to understand, and manoeuvre within, the political superstructure surrounding issues of community-based conservation.

6.5. Linkages keeping the project alive

6.5.1. Individual linkages and problem-solving

Although CFCs are mostly dormant, some Committee members still function as links between the community and the EFC and NRDDB (Figure 6.6). In some circumstances, events at the community level can reactivate CFC members: *"[name given] is try to do something, hold some meetings with the fishermen, gives us updates on some items, like Aquarium [project]. I feel glad when I hear about things"*; and sometimes entire Committees: "*The CFC held a meeting only when EFC came in [to the community] this year"*. Some CFC members also continued to actively monitor and report instances of harvest. In one case, a CFC and former CEW described an instance of an alleged harvest within the community and his reaction, saying

"So we went there to investigate...this happen early this year.

What did you do?

We didn't do anything, we just talk to him, tell him what will happen if he continue to catch this endangered species. We reported it to the EFC and [name given] himself, and I don't know who [else]. They came and talked to him. So it was reported to the EFC"

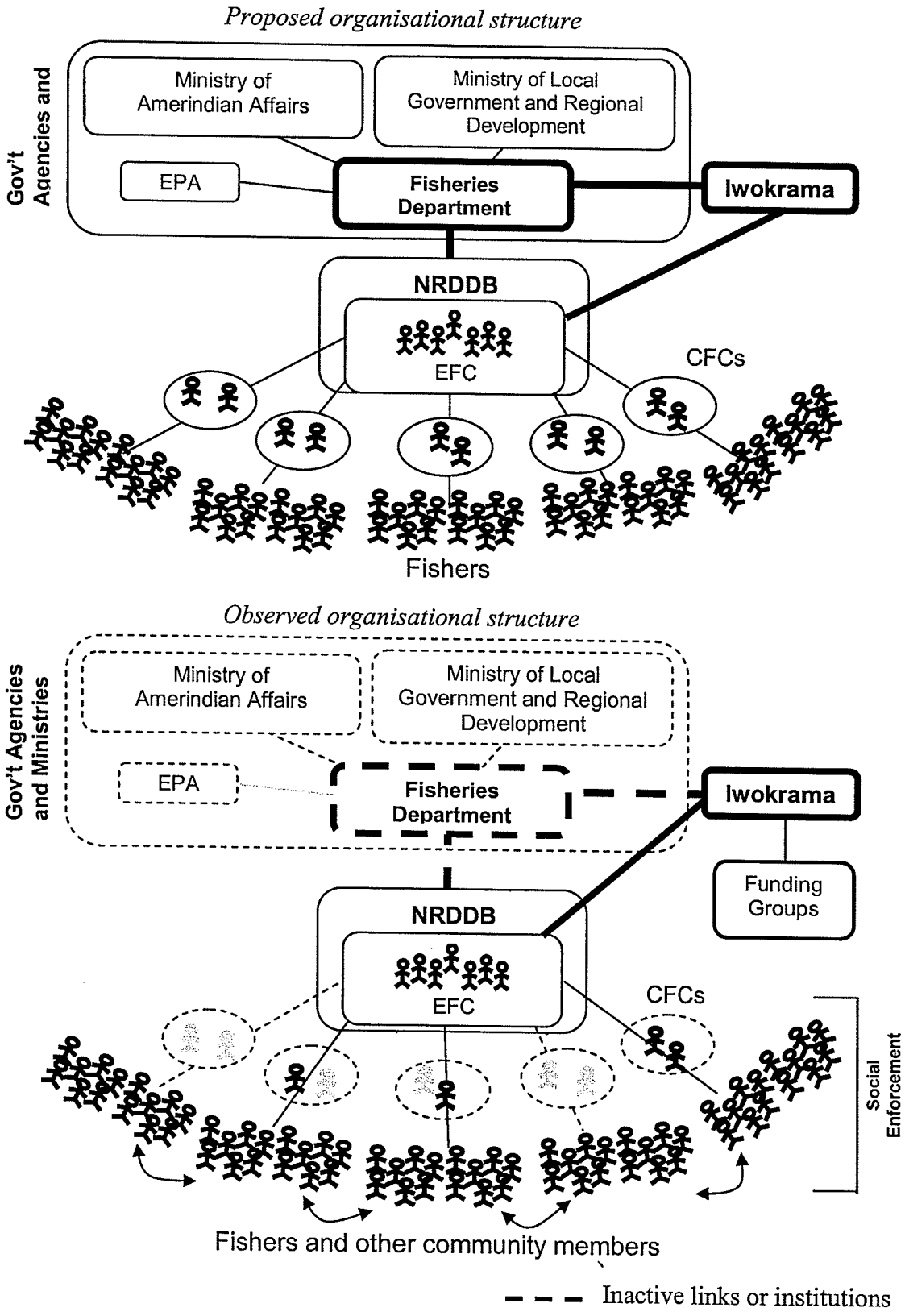


Figure 6.6 - Porposed and actual organisational scheme for the implementation of the Arapaima Management Project (2003)

The primary characteristic distinguishing these active individuals seem to be a history of involvement with NRDDB and Iwokrama projects. Some also tend to be involved in other NRDDB projects and/or occupy positions in other regional level committees, thereby regularly interacting with EFC and NRDDB members. One CFC member in particular was a trainee in Iwokrama's Forest Ranger program, which led to his involvement in the Mamirauá training, him becoming a CEW, a member of the NRDDB executive, and finally a Touchau. Many of these individuals speak positively of the NRDDB and Iwokrama personnel, referring to years of shared experiences and history.

Unlike the CFCs, the EFC continues to function, albeit as more of an extension of the NRDDB rather than an institution onto itself. This is due to the presence of at least four EFC members on the NRDDB executive body. During the study, the EFC was engaged in outreach and monitoring activities in the area, conducting river patrols and community meetings in all of the thirteen NRDDB communities. The EFC had also become involved in the NRDDB Aquarium fish project, and had initiated discussions in some riverine communities about the possibility of a food-fish management system. EFC members also met several times with the Minister of Fisheries to promote the Plan following the 2002. According to one EFC member, the Minister claimed to have never seen the Plan prior to their meeting, with the EFC member responding by giving the Minister his personal copy of the Plan. That and subsequent meetings have all resulted in assurances that the Plan will be approved. This has yet to materialize. Action at both the community and NRDDB action exhibits characteristics of learning-led modes of collaboration, involving "...temporary coalitions that enter into negotiations within the problem domain for a period of time and then disappear" (Westley 1995:414).

6.5.2. The NRDDB-Iwokrama relationship

The relationship between the NRDDB and Iwokrama is key to the Project's survival. Iwokrama continues to source funding for project activities, such as EFC outreach activities and the annual population surveys. Through links with Iwokrama, the NRDDB implement a number of alternative livelihood projects including the NRDDB Aquarium fish enterprise, and the marketing of natural products such as honey and craft.

Joint Iwokrama NRDDB institutions such as the CEW Programme have also facilitated a seemingly successful outreach and education campaign. CEWs were mentioned consistently during the research as having had an impact on local perspective of management and conservation. These including comments like "*CEW go talk to fisherman, since then the person ease up*", "*Since the counting, CEW outreach, people don't really eating Arapaima"* and *"We get to understand the need to conserve, and the goal in end is to harvest."* These CEWs, and a number of other community members, were involved in Iwokrama sponsored training workshops. They received training in report writing and leadership, among others things, which some attribute to their success. As one former CEW put it *"We had training...particularly interpersonal, and leadership, and oral communication and them kind of thing. So that built my skills more, I have more confidence in me, and how to lead the people and them kind of thing"*. More importantly however, these individuals were from the communities, selected by the village council, and living among other community members, relative and friends. They were therefore part of the social fabric of their communities, and proved to be effective links between communities and larger institutions such as the NRDDB and Iwokrama. This link proved crucial in developing a positive image of the NRDDB, and more importantly Iwokrama, at the community level. With this link to the communities' informal social networks, it is not surprising that the outreach and awareness campaign relating to the Arapaima harvest seems to have been so successful.

From its rocky beginnings, the NRDDB-Iwokrama partnership has grown into one of the primary drivers of change in North Rupununi communities. This relationship also remains at the heart of the Arapaima Project's institutional network. Both organisations work at similar scales, but link to very different actors and institutions. Iwokrama is particularly effective in identifying international interests and concerns, accessing resources, and bringing both national and international recognition to local issues. On the other hand, the NRDDB has been relatively effective at linking these elements to local needs and represents local aspirations for development and conservation of their natural resources.

I would argue that Iwokrama used its influence in this relationship to push a conservation agenda among the North Rupununi communities. This has been observed in many such partnerships, where NGOs dependence on international funding has exposed them to "First World" agendas. In such cases, the environmental problems of the developing country viewed in a highly selective fashion, focusing on problems of interest mainly to the developed world (Mowforth and Munt 1998). As was discussed in Chapter 5, this may have well been the case in early interactions between Iwokrama and the NRDDB.

However, this issue can also be argued from the side of the communities and the NRDDB. It would appear that the NRDDB was quite successful in using its relationship with Iwokrama, to access human and financial resources, and facilitate self-organisation and institution building at the community level. In fact, following the construction of the "highway" through the North Rupununi, a long-time member of the NRDDB is well known for saying early in his interactions with Iwokrama *"We must prepare ourselves to use the road – so that the road does not use us."* It seems likely that a similar approach was taken in dealing with Iwokrama. The NRDDB now is most certainly less subject to Iwokrama's influence, having utilized this relationship to establish independent linkages with funding and research institutions.

Whatever the case, the Iwokrama-NRDDB seems grounded in shared objectives and a long history of person to person interaction. From comments on both sides during the study, this relationship seems to be very positive and based on a high level of trust and reciprocity. For instance, in 2003, Iwokrama lacked the funding to conduct a thorough timber inventory of its Reserve. In response, the NRDDB offered to organise and conduct the inventory at lower costs, citing the history of reciprocity between the NGO and local communities. In 2004, Iwokrama faced a major funding crisis and needed bridge funding for a number of months. The NRDDB and a number of community representatives traveled to Georgetown and met with the President to lobby for the funding needed to keep Iwokrama functioning. In the end the Government agreed to step in, and Iwokrama continues to operate to this day. The strength of this relationship is not only fundamental to the continuation of the Arapaima Project, but it represents the best bet for successful

community-based conservation and development of local resources in the North Rupununi.

These positive partnerships, and their influence on individuals and institutions, underscore the importance of personal relationships and trust in maintaining effective cross-scale institutional linkages. All too often, projects fail due to a lack of trust and respect between major stakeholders. This trust can only be built through years of interaction built on mutual respect and proven track records of inclusion, reciprocity and accountability.

Chapter 7

Conclusions and lessons-learned

Community members releasing a juvenile Arapaima

7.1. Introduction

This chapter aims to summarize the study's major findings and present them as a series of lessons that can be applied in the current Project, in other NRDDB sub-projects, and to the theory and practice of community-based conservation in general. So to recap, the study's goal was to identify lessons-learned in community-based conservation. I attempted to realize this goal through a case-study of the Arapaima Management Project in Central Guyana.

The Chapter is divided into four major sections. The first three presents lesson specific to the research objectives used to structure the study, including: 1) investigating the role of community self-organisation in the development of the Project; 2) examining the cross-scale institutional linkages that facilitated the development and implementation of the Project; and 3) identifying tools or interventions that can be used by NGOs and community organisations to increase governmental support for the Project. The final section presents a summary of cross-cutting lessons which emerge from the research findings.

7.2. Objective 1: To investigate the role of community self-organisation in the development of the Arapaima Management Project.

This section examines the factors that drove self-organisation at the community level, leading to the development and implementation of the Arapaima Project. The lessons presented here fall under two themes. The first theme relates to Project development and its impact on the processes of issue definition and action mobilisation (lessons 1 to 3). The second theme involves local involvement in Project activities, and its effect on local attitude towards Arapaima management (lessons 4 to 6).

7.1.1. Issue definition and action mobilisation: making the link

Lesson 1 – Although community leaders are good at issue definition, in the end they may not be the most dependent on the resource at the community level, or the persons tasked with the long term implementation of the Project.

Issue definition leading to the Arapaima Project was led by a group of community representatives, who identified Arapaima management as a high priority in North Rupununi communities. Although fisheries committees were then set up in the 13 member communities, community mobilisation behind these institutions quickly faltered. In essence, the Project was offered to the community and they accepted, just as the Committee positions were offered to individuals, who accepted. This level of "community involvement" in issue definition does not seem, at least in this case, to effectively translate into community mobilisation behind local management institutions.

Problem identification should therefore go beyond the views of local representatives; involving more of a fine-scale, community-level approach to capture the perspectives of resource users. Projects and local institutions focussed on addressing issues that are very relevant at the community level are more likely to receive broad community support. Community involvement in the development of the Project and Management Plan should have gone beyond the involvement of regional level representatives, and one-off meetings at the community level. Rather than just appointing committee members to their positions, more resources should have been directed at institutional building and development, particularly in the case of the CFCs. These activities may have arguably led to increased community mobilisation behind such institutions.

Lesson 2 – Community-based conservation projects are more likely to be effective if they involve a core group of dedicated and committed individuals.

Although most of the CFCs were dormant, many individual CFC members were still active as links between the community, the EFC and other regional institutions. These individuals were also involved in monitoring the activities of fellow fishers and local problem solving. These personalities seemed to be characterised by a long history of involvement in local initiatives, a commitment to resource sustainability, and a sense of community pride.

In order to develop this "energy centre", interested and committed individuals have to be identified and empowered. Committed individuals may be identified through referrals at the community levels, or by consistent performance of individuals in other projects. In this case, it is easy to identify the individuals who have stuck with the Project. Once identified, these individuals should be assigned roles as key point persons for the continued and future implementation of the Project.

These persons may also be empowered though capacity enhancement programmes. In fact, some of the Project's more dedicated individuals attribute their commitment to participation in Iwokrama-NRDDB "capacity-building" workshops. It is important to note, however, that there is still a significant gap in local institutional and management capacity. Currently, management capacity is still very concentrated at the leadership level. As a result, many institutional and leadership positions are filled by the same pool of individuals, with persons stretched thin for time and energy. Local capacity, although on the increase, still continues to be a limiting factor in achieving true community-based natural resource management in the North Rupununi.

Lesson 3 – External groups can be key transformative forces in stimulating community self-organisation in community-based projects.

This is clearly demonstrated by Iwokrama's role as a key agent of change in the North Rupununi. The organisation was key facilitating meetings and regional level forums that led to the development of the NRDDB and the Project, and has contributed both resources and institutional support to these efforts.

However, even the most well intentioned external groups must remain cognisant of their power to influence and bias community-based initiatives. Iwokrama's decision to focus on Arapaima management was the critical step in the realization of the Project. However, the emphasis on the conservation of an endangered and charismatic species, rather than on other "food-fish" may have been a reflection of their own conservation-leaning bias. The Project's Arapaima focus also made it dependent on Government approval, since

harvest is currently illegal. The resulting delay has played a large part in the dormancy of the local management institutions created under the Project. I would argue that had the Project focussed on a less difficult species, communities may have already begun to benefit economically from the initiative. Whatever were Iwokrama's motivations for focusing on the Arapaima, its influence demonstrates the vulnerability of issue identification in community-based conservation to external agendas. If too much external influence is exerted, the "community" in community-based can quickly disappear, only to be replaced by ineffective projects which fall apart without constant external support. The challenge is figuring out "how much is too much", which will depend heavily on local conditions and existing community capacity.

7.1.2. Community involvement and change in attitudes

4. Culturally sensitive environmental education and associated changes in social norms can play critical roles in conservation. This is important in situations where formal institutions are culturally inappropriate, non-functional, or slow to develop.

In this case it seems that the changes in attitudes were linked to an in-situ awareness campaign (CEW) in addition to endorsement of the Project by community leaders. The awareness campaign seems to have contributed to a change in fishers' attitudes, and increased confidence in collective action at the regional scale. In addition, there seems to be informal monitoring within communities, where gossip and ostracism are operative in the social enforcement of the ban. *Social enforcement of the ban therefore appears to be more effective than formal mechanisms, and has contributed to the apparent increase in numbers.* This community-level monitoring is critical to local conservation efforts, and can only result if project activities align with local objectives and aspirations.

Changing local perceptions and behaviours is one of the most challenging tasks in shifting an unsustainable livelihood to a more sustainable state. The fact that this appears to have occurred in the Project bodes well for the Project's survival. *This lesson highlights the importance of focusing on project outcomes, rather than solely outputs, when evaluating the success of community-based initiatives.*

Lesson 5 – In low-data fisheries, community-based monitoring which draws upon local knowledge can: a) serve as a useful entry-point in encouraging community support for community-based conservation initiatives; and b) produce superior data which can then be used to make more informed management decisions.

The use of local knowledge in monitoring has demystified management for many community members. They see that their existing knowledge can play an important role in the conservation of their resources. Their involvement in monitoring has also led to local ownership of the survey findings, and the project in general. As the primary actors in the monitoring programme, trained counters are exposed to resource conditions at a regional scale. As a result, many seem to have gained more of a regional perspective on management and monitoring. Counters also acted as community advocates of the ban and contributed to increased local awareness of management efforts.

By incorporating local knowledge in conservation initiatives, outside groups like Iwokrama and the Government are not only more proficient at gathering management data, but can also encourage local buy-in. This type of monitoring is essential for successful community-based conservation, particularly in developing countries where field conditions and extremely limited resources make conventional scientific research methods impractical.

Lesson 6 – Stock recovery is also a useful starting point for involving local communities in management, and increasing their support for future management interventions.

By first focusing on stock recovery (the ban), the Project linked management actions with an increase in the resource base, and more secure livelihoods in the long run. Subsequently, local involvement in resource monitoring serving as a direct feedback loop between community efforts and improvements in the resource state. This enabled them to directly observe the consequences of their actions, and arguably increased their support for future management interventions.

7.3. Objective 2: To examine the role of cross-scale institutional linkages in facilitating or hindering the Project.

This objective was addressed by investigating the institutions, and institutional relationships, that were key facilitators or barriers in the development and implementation of the Arapaima Management Project. The lessons presented here focus on the importance of individual relationships (lesson 7), linkage organisations (lesson 8) and Governmental support (lesson 9) in the performance of the Project.

Lesson 7 – Institutional linkages often boil down to people linkages. Therefore, effective cross-scale linkages can only be facilitated through individual relationships based on respect, trust and a sense of reciprocity.

By emphasising the role of local knowledge in management, Iwokrama demonstrated that it was open to alternative forms of knowledge, monitoring, and management. This approach was a major show of respect for local knowledge and abilities, and served as an important foundation for trust and relationship building between scientist and community members. This case thus emphasises that effective collaboration is depended on positive relationships between individuals that are open to alternative knowledge systems. For local knowledge to be incorporated in community-based and co-management, scientists must view local as a legitimate approach to the acquisition of knowledge, not an inferior one. Scientists cannot go into collaborative projects seeing themselves as the experts, but rather focus on developing partnerships with local fishers in order to help implement effective management strategies. This may only be achieved through cross-cultural education and acceptance on both sides.

Lesson 8 – Community-based conservation initiatives can benefit from a close partnership with organisations that can navigate within, and link between, multiple levels of organisation.

Both the NRDDB and Iwokrama work at similar scales, but link to very different actors and institutions. Iwokrama played a key role as a linkage organisation in both the

formation of the NRDDB and the development of the Arapaima project. They also provided for external forums of discussion, allowing for dialogue between fishers and government officials. Iwokrama is particularly effective in identifying international interests and concerns, accessing resources, and bringing both national and international recognition to local issues. On the other hand, the NRDDB has been relatively effective at linking these elements to local needs and represents local aspirations for development and conservation of their natural resources.

However, too close of a partnership between community institutions and outside groups can put local agendas at risk for co-option by external goals. The NRDDB was very dependent on Iwokrama's support following its creation, and may thus have been overly exposed to external influence. Early joint projects between the two organisations, such as the Conservation Contract Programme, seem to emerge primarily from the conservation-learning concerns of donor agencies rather than local aspirations. The resulting lack of significant community mobilisation behind such projects may have played a role in their eventual failure.

The NRDDB has moved towards increased self-sufficiency by creating linkages with other partner institutions and the government independent of Iwokrama. It remains to be seen whether the NRDDB can exist in its present form in Iwokrama's absence. It is clear, however, that this relationship has provided a solid foundation for the NRDDB to evolve and grow into a legitimate organisation. As a result, the NRDDB is much better positioned to continue its mission of sustainable development in communities of the North Rupununi.

Lesson 9 – *"Unless the Government can support us and give us the authority and help us to enforce the law then, and only then, you can get the Arapaima program really on the go, and it would work, and everybody would benefit."(Elder and former fisher)*

The major obstacle to Arapaima co-management in Guyana is Government's failure to endorse the proposed Arapaima harvest. This lesson speaks to the importance of resource

access and jurisdiction. In this case, the Government has full jurisdiction to the resource, and is either slow or unwilling to transfer user rights to the communities and NRDDB. This may be related to a number of factors, including little Government experience with co-management regimes, and the low national economic importance of this fishery. The MFCL may also be apprehensive about setting precedence, since it currently maintains full jurisdiction over all National fisheries. Unfortunately, without jurisdiction the communities cannot access the resource or, more importantly, access the benefits of resource management.

For the project to be successful, jurisdictional boundaries and management responsibility has to be more aligned with the geographical distribution of the resource. The major challenges therefore seem to be the strengthening of local and regional management institutions (see Table 4.1), tied to the distribution of jurisdictional and management authority between the communities and Government.

7.4. Objective 3: To identify tools or interventions that can be used by NGOs and community organisations to increase governmental support for community-based conservation.

Increased Government recognition has occurred to some extent in the Project, but still remains its biggest challenge. The following points highlight both interventions that were employed by the Project (10 to 11), and others that may be required to stimulate the Government buy-in necessary for the full implementation of the Project (12-14).

Lesson 10 – Local participation in stock recovery can serve to demonstrate local commitment to management and conservation of the resource.

The observed recovery of the Arapaima stock in the North Rupununi is a major accomplishment that must be attributed, first and foremost, to the people of the area. By adhering to the ban, local fishers have showed that they are prepared to suffer short-term losses in an effort to ensure the long term sustainability of the fishery. They have also demonstrated to government that they are responsible conservationists capable of

monitoring and disciplining themselves. In so doing, they have challenged the common assumption of government managers of fishers as "...untrustworthy individual predators who would willingly decimate the resource for their own short term gain" (Pinkerton 1989:09). They have therefore removed the ability of Government to use issues of local commitment to conservation as a reason for withholding management authority.

However, this may not be enough to generate Government support or recognition of management rights. The continued lack of Government support for local management authority, and its questioning of the survey method demonstrate that efforts must go beyond local self-management.

Lesson 11 – Third body recognition and legitimization of community institutions and knowledge can encourage increased State recognition.

Iwokrama has been able to draw on its legitimacy and visibility at the international level to negotiating more State support and recognition of the Project. By recognizing the NRDDB's legitimacy, and supporting its development with human and financial resources, Iwokrama has empowered local institutions by increasing the NRDDB's power in dealing with Government and other outside actors. Iwokrama can thus be seen as a key sponsor of change with the potential to "...redefine and reframe the nature of the problem in such a way that actors are persuaded that a joint problem-solving and a joint decision-making approach is required" (Pinkerton 1989:25). That said, this influence has not been enough to push Government to recognise local management rights in the Project. This may require a revisiting of Iwokrama-NRDDB approaches to negotiating with government.

Lesson 12 – Appropriate training may enhance the ability of researchers and managers to effectively navigate the political process.

The lack of sustained dialogue and negotiation between Project personnel and Ministry officials may have undermined institutional linkages between the Project and the

Government. This underscores a more fundamental issue of researchers and managers that lack training and experience in the political process.

As such, Project personnel may require additional training and experience in policy processes, and political negotiation and communication in order to more effectively negotiate the political process. They must also remain cognisant of their own roles and positions within this political milieu. Without these skills, it is often difficult to understand, and manoeuvre within, the political superstructure often surrounding community-based conservation.

Lesson 13 – Interaction between fishers and Government officials can be used to bridge the gap between these groups.

One of the major issues raised by Government representatives was the scientific validity of the survey method. These questions were also raised in the Brazilian case, and were only addressed through Government officials visiting the site, meeting the fishers, and observing the counts first hand. Increasing State confidence in the counts, and community-based monitoring in general, may therefore be encouraged by facilitating direct interaction between governmental decision-makers (Minister of FCL) and the fishers of the North Rupununi. By observing the surveys first hand, officials may be more open to accepting the survey methodology, and more responsive to community collaboration in the future.

Lesson 14 – Increasing project visibility, along with sustained and structured dialogue between Government and Project personnel, may also serve as useful tools in gaining State support for community-based management.

Following from Bryant and Bailey (1997), more emphasis should be placed on increasing the visibility of the Project at the national level, through public awareness campaigns; and internationally, through pushing the initiative at international conferences and similar forum. More importantly, the Project should directly engage Governmental decision-

makers through regular and structured dialogue. This dialogue should focus on effectively communicating the benefits of collaboration and identifying the prerequisites for the transfer of management authorities to the communities. This must also be combined with a revamping of the local management institutions.

7.5. Cross-cutting lessons

The lessons summaries in this section emerged from analyses of the Study's three objectives, and are thus presented here as cross-cutting lessons. These lessons emphasise the importance of understanding the role of local history and culture (lesson 15), time (lessons 16) and context (lesson 17).

Lesson 15 - The first step in attempting to implement successful community-based conservation is to understand the local culture and the history of resource use in the area.

Arapaima harvest is a fairly recent activity in the North Rupununi, and many interviewees recalled a time when they were afraid to eat the fish. Arapaima harvesting as a livelihood is therefore fairly new to the Makushi, and many of the fishers do not see the ban as a major obstacle, saying "*...we just catch other fish*". In addition, the Arapaima taboo, and similar restrictions, in traditional Makushi culture hints at a local belief system which was somewhat consciously conversation oriented. It is clear that, although the Arapaima taboo has lost most of its effectiveness among the people of the North Rupununi, the social mechanisms that made it so effective are still critical to contemporary efforts at community-based conservation. Therefore, attempting to incorporate these mechanisms in current management requires an understanding the local culture and the legacy of traditional restrictions. In the case of the North Rupununi, the taboo, and the lack of a strong Arapaima fishing culture presented a very receptive environment for certain management interventions. Also, the pre-existence of a conservation ideology (the taboo) among the Makushi, and their adherence to the harvest ban, supports Pinkerton's (1994) assertion that the presence of such ideologies at the local level can optimize the benefits of community-based management systems

Lesson 16 – Everything takes time.

As the Project demonstrates, it takes time for effective management institutions to develop; it takes time for relationships, trust and effective cross-scale institutional linkages to emerge; and it may take time and evidence for Governments to be convinced of the effectiveness of community-based initiatives. If community-based conservation is to be effective, communities, Government, funding groups, and supportive organisations must be committed to the long term process involved. As one villager commented *"You can't plant a mango tree today and expect mangoes tomorrow"*. In the meanwhile, the communities and the Arapaima continue to wait for the proverbial mango tree to grow.

Lesson 17 – In the end, successful community-based conservation may be dependent on having the right ingredients at the right time.

The conditions that have facilitated the growth and development of the Arapaima Management Project can not be seen as a series of separate lessons. They represent a series of events, interventions, learning cycles and innovations all framed by the context of local conditions. Many of the successful aspects of the initiative depended largely on the people involved, the policy environment, and the sequence in which linked projects were developed and implemented. In other instances it depended largely on the intervention of an outside group at an opportune time, as was the case with Mamirauá and WCS funding. It is within these complex, and highly contextual, series of events that many of the initiative's successes lie.

As with natural systems, these projects have properties that only emerge as time goes on, and in these emergent properties may rest the answers to the question "What makes community-based conservation work?" Although this report outlines very relevant lessons learned from the project, determining what exactly "made the project work" takes on the ground experience with years of mistakes and learning.

Every community-based conservation project will have differing challenges and require different approaches. However, community-based Arapaima management in the North Rupununi demonstrates that using a suite of approaches, understanding local culture, effectively engaging Government, and targeting informal social mechanisms with a history of success can be very effective. In the end, the Project shows that the potential benefits of community-based conservation are worth both the time, and the mistakes. As one CEW put it *"Iwokrama help to open our eyes, and now we can manage our own resources."*

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Appendix 1 –Semi-structured Interview Questions

Communities

What do you do for a living/livelihood activities?

Personal involvement in the Project

How did you hear about the project?
How did you get involved? Why?
Did you get any training from the project? How did this affect you making a living?

Local involvement

Did you, other fishers, feel that there was a need to manage the Arapaima?
Were you involved in meetings to develop the Plan?
Was the Plan explained to you? Are you clear about the Plan?
Do you feel that there was enough local involvement in developing the project/Plan?
Is the plan seen as a community project or an outside project?
Are you pleased about how the Plan was developed?
Do you still support the project/Plan? What problems do you see?
Are fishers in your community aware and supportive of the Plan?
How well do fishers in your community understand the Plan?

Arapaima harvest history and ban

Are there any local stories about the Arapaima?
When did people start fishing/selling Arapaima? Why?
Did you fish/trade Arapaima in the past? When? For what purpose? How often/much?
How is the ban working? How can the ban be better?
Are people in your community still fishing Arapaima? Why? Why not?
Was Arapaima fishing going on after the ban? If yes, how did the community/CFC/EFC react?
How as the ban affected you/your village?
What will happen to the ban if the management plan/harvesting isn't approved soon?

Fisheries Committees

How did you become involved in the CFC? How is the CFC in your community working? When was their last meeting? What are the problems with the committee?
How did you become an EFC member? How is the EFC working? When was their last meeting? With your CFC?

Checkpoints

Where did the idea for the checkpoints come from? How were they developed?
How are the checkpoints working? How can they be improved?

Counts

Do you know about the counting? How does it work?
Were you involved in training? Could you count Arapaima before the training?
Do you think it works/the counters are accurate?

General comments

What is the most import thing I should make a note of?
Is there anything else you wanted to talk about?

Ministry of Fisheries

- How did you first get involved with the NRDDB and the project? Why?
- What was the nature of your involvement?
- How did you become involved with the aquaculture study in the North Rupununi? (funding, linking?) What was the outcome?*
- How was the MOU between Fisheries and Iwokrama developed?
- How has the Ministry's been involved in the project since the development of the Plan? What will be Ministry's role in management decisions if the project is implemented? What are the constraints to this involvement?
- Is your Ministry involved in other community-based projects? What are they? How are you involved?
- Do you think that projects backed by NGOs are more likely to receive government recognition and support?
- How can NGOs work better with Government? What can make this relationship difficult?
- What role should community-based groups play in future fisheries management in Guyana? How should Government be involved?
- How does your Ministry's/Government's policy towards community-based projects differ now compared to 5 years ago? If different, what led to this change?
- How has your/ your Ministry's involvement in the project affected your/ your Ministry view of the project and community-based management in general?
- Why was the last Fisheries Act reformed? Who where the major players? What policy processes has it gone through?
- Where did the new Plan's provision for management plans (that allowed for the Arapaima project) come from?
- What are the project's successes/ failures/ challenges?
- What would be the best way for communities and associated NGOs to increase government support and backing for their projects?

*Directed to the Senior Fisheries Officer who conducted an aquaculture feasibility study in the North Rupununi.

Minister of Amerindian Affairs

- How is your Ministry involved with the project/NRDDB?
- How was it introduced to you? Did other organisations play a role?
- Is your Ministry involved in other community-based projects? What are they? How are you involved?
- How can NGOs work better with Government? What can make this relationship difficult?
- What role should community NGOs like NRDDB play in local conservation and development? How should Government be involved?
- How does your Ministry/Government's policy towards community-based projects differ now compared to 5 years ago? If different, what led to this change?
- Why was original Amerindian Act reformed? Who where the major players? What policy processes has it gone through?
- A major aspect of plan is increasing the community resources rights. Does new Amerindian Act allow for increased tenure and access rights to resources? Is there room for increased rights to resources? What would bring about more government support for this?
- What are the project's successes/ failures/ challenges?
- What would be the best way for communities and associated NGOs to increase government support and backing for their projects?

Iwokrama personnel

- How was Iwokrama involved in the development of the NRDDB and the Arapaima project?*
- How was Government involved in the project?
- How was the partnership with Mamirauá established? How did it affect the project/Iwokrama?
- What institutions/partnerships were important key in developing the project? How were these partnerships developed?
- What were some of the barriers to the project? How were they overcome?*
- How did/does the policy environment impact the project? (e.g., policies, legislation, political space for experimentation)
- What change (if any) did the project trigger in government legislation or policy?
- First survey attempts: why, what method, what did it achieve?
- Arapaima survey training program: origin, development, selection of trainees*
- CEW program: origin, running, linkages with existing institutions (proposed and actual), program closure.*
- Conservation and checkpoints contracts: origin, running, linkages with existing institutions (proposed and actual).*
- Alternative livelihoods: the attempts, how successful, how equitable? Has any poverty reduction been achieved? Indicators?
- How has the project affected the way Iwokrama deals with communities?
- How has the institutional partnerships formed in the project been maintained?
- What are the project's success/ failures/ challenges?

*Also used in interviews with EFC members involved in project planning and development.

Appendix 2 – Brief history of institutions and livelihood activities the North Rupununi

Year	Local conditions and major events	Livelihood activities
Pre 1800s	Loose social structures, kin-based settlements. Local belief system including a number of socially enforced food taboos.	Semi-nomadic, complex of hunting, fishing, gathering of wild food, shifting cassava cultivation. Some trade networks for curare, pottery, gold.
Mid 1800s	Permanent missionary outposts, settlements to becoming more nucleated, evangelisation of Makushi, increased exposure to colonial structures.	Traditional subsistence activities, with some trading in new items to the missionaries.
Late 1800s	Movement of some Europeans settlers and businessmen into area from the capital. Served as representatives of the Crown at local level. Creation of roads and infrastructure, increasingly nucleated villages.	Traditional subsistence activities, Establishment of large-scale cattle ranching and balata (rubber substitute) trade. Movement of Wapishana Amerindians, and other settlers into the area for employment.
1900 – 1950s	Establishment of regional administrative centres, followed by Amerindian village and district councils.	Traditional subsistence activities, employment in ranches/balata; widespread abusive debt-peonage systems. Breakdown of local culture, belief systems with integration into the cash economy.
1952	Fisheries Act forbids harvest of Arapaima. Evidence suggests that law resulted from request by well established British settler, and overharvesting of Arapaima populations closer to coast	Traditional subsistence activities, employment in ranches/balata.
1950s - 1960s	Increased movement between Brazil and Rupununi; transfer of fishing technology from Brazil.	Traditional subsistence activities, employment in ranches/balata; seasonal employment in Brazil. Beginning of wildlife trapping; trade in Black Caiman skins, Giant Otter pelts and Arapaima to Brazil.
1969	Rupununi Uprising. Cattle ranches attempted to create a separate, independent state in the Rupununi. Government suppressed uprising, confiscated cattle.	Collapse of cattle ranching as major economic activity in the region.

Appendix 2 – Brief history of institutions and livelihood activities the North Rupununi (Continued)

1970s - 1980s	Establishment of Annai Amerindian District (Reserve). Recognises right to fraction of traditional land; includes 5 villages of NRDDB. Outsider overharvest raised by community members at regional meetings with government; short-lived, follow-up police patrols. Arapaima trade illegal in Brazil.	Traditional subsistence activities; seasonal employment in Brazil; wildlife trapping; some Government subsidized peanut farming; little ranch employment; balata trade closes.
1992	Establishment of the Iwokrama Rainforest Reserve and Field Station. Completion of Georgetown-Lethem Road which passes through area.	Some new employment in Field Station functioning and Iwokrama research activities
1996	Creation of the NRDDB.	Creates new opportunities for training and employment as Iwokrama Forest Rangers and in joint NRDDB - Iwokrama conservation, development and research projects.

Appendix 3 – History of the North Rupununi Arapaima Management Project

Year	Conditions leading to initiative	Alternative livelihood options	Arapaima populations
1998	Meetings between Iwokrama, Government and local communities Discussions between Iwokrama and communities, alternatives to Arapaima identified, including bee keeping, aquaculture, brick making, crab oil.	Iwokrama rangers active in Iwokrama – NRDDB outreach campaigns and workshops conducted in area. Conservation of endangered species primary message.	Low level of harvesting, some trade with Brazil.
1999	Experimental surveys by Iwokrama and CEWs to determine if counting feasible. Creation of links with Mamirauá; visits by 3 CEWs. Government conducts Aquaculture feasibility study for area; low potential found.		Low level of harvesting, some trade with Brazil.
2000	Meetings between NRDDB, Iwokrama; UK and Brazilian scientists and Dept. of Fisheries officials. NRDDB decides to adopt ban, develop Management plan. Establish Fisheries Task Force under the NRDDB. 4 persons appointed to examine local fisheries, plan, alternatives Some communities interested in Arapaima aquaculture.	Community Environmental Workers established in communities. One or two local part-time workers in each village. Iwokrama provides link to market for locally produced NTFPs, including Crab Oil and Honey.	Occasional harvesting, some trade still occurring, but greatly reduced.
2001	Brazilians train 13 local fishers. First count conducted in March with Brazilians. Second count conducted in November. New fishers trained in counting methodology.		Occasional harvesting, some trade still occurring, but greatly reduced. First training count shows a population of 422; second larger count later in year show a population of 888.

Appendix 3 – History of the North Rupununi Arapaima Management Project (Continued)

2002	Meeting between Brazilian scientist and representatives from the communities, NRDDB and Iwokrama to develop draft management plan Community visits by three person team of Iwokrama and Brazilian scientists and NRDDB representative to present draft plan. Formation of CFCs. EFC elected. Meeting to develop 2nd draft management plan. EFC formed trough elections at general meeting. EFC present plan to NRDDB, plan approved, 2 members appointed by NRDDB 3rd draft prepared, presented to Ministry of Amerindian Affairs, Ministry of Fisheries Crops and Livestock, MLG & RD and the EPA.	NRDDB Aquarium Trade begins with first shipments of fish from the area. Local harvester employed to harvest, with profits reinvested in project and other NRDDB initiatives.	Few reported cases of harvesting, some accidental catches. Third survey shows an increase to 1000
2003	Meetings between EFC president and Minister of Fisheries; Approval of Plan discussed. River patrols by EFC members Outreach meetings held in river community Meetings held in two villages outside of the North Rupununi that fish in the area. Arapaima Management Plan presented.	Tour guide training, with one representative from each community; some employment wit Iwokrama and visiting Tourists	2 cases of harvesting reported to EFC. EFC members visit the homes of the accused harvesters; in both cases; the catch was said to be accidental. CEW program comes to an end.
Late 2003-2004	Fourth Arapaima count conducted; additional fishers trained.		Survey finds a population of 1200. Increase lower than expected; exact cause, whether natural or harvest related, uncertain.