Learning from Maroon Water Resource Management Traditions, and Practices in Blue Mountains National Park, Jamaica

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Executive Summary

Rivers and other freshwater ecosystems now rank among the most exploited and degraded ecosystems on the planet. It is evident that a massive shift in how societies and individuals value and manage freshwater ecosystems is required to halt and reverse the trend of freshwater degradation. This shift must stress the view of clean water as more than a disembodied, detached commodity, but as a product of functional ecosystems which also provide food, recreation and other services. An essential pre-requisite for environmental change is shaping public attitudes and behaviour through effective environmental communication. Effective environmental education requires a thorough understanding of public attitudes and values so that messages can be tailored to the audience.

This study of Maroon water resource management traditions and practices is the first of many steps in implementing successful \textit{in situ} freshwater ecosystem conservation in the context of a Jamaican watershed. The Maroons are a continuous link with pre-colonial Jamaica and have a more than 300-year legacy of intimacy with forest and aquatic ecosystems and communal ownership of these resources. The main premise is that the Maroon’s history of autonomy, semi-isolation and dependence on local natural resources would have fostered home-grown natural resource management knowledge, systems and traditions. The study started with the prospect of uncovering an indigenous Maroon freshwater conservation ethic and values that can inform and guide the management of habitats in the national park and the rest of the island.

The main research activities were:

a. Measuring and describing Maroon water values and water resource management practices.

b. Examining the contribution of these values and practices to park objectives concerning freshwater ecosystem conservation.

c. Recommending how traditional Maroon values, practices and governance structures can inform BJCMNP management and freshwater ecosystem conservation.

Participatory research methods were used in this project: focus group meetings (incorporating priority ranking, problem tree analyses, and resource mapping) and interviews. The results indicate that Maroons have retained a river culture. Even with a regular piped water supply, Maroons use the freshwater ecosystems in Rio Grande for a variety of domestic, recreational and cultural activities. Aquatic ecological knowledge is concentrated among elder Maroons however all age groups are involved in the harvest of fish, shrimp and snails (12 species were documented during this research) using several traditional and modern tools. In times past, dependence on local resources and strong community cohesion led to the conservation of freshwater ecosystems through zoning, unwritten rules and arbitration by the maroon Council. However, this was not entrenched or formalised and no present-day conservation practices were uncovered.

However, the Maroons were dissatisfied with the current degraded state of the river and largely supportive of conservation. It is suggested that the relict of the Maroon river culture and knowledge be used as a foundation for the national park’s freshwater conservation activities. Additionally, these efforts will serve the dual purpose of reinforcing the transmission of maroon culture which is rapidly disappearing with the transition of the elders and assimilation of the remaining community.
Acknowledgements

The participatory nature of this study necessitated the involvement of several persons and agencies. I am very grateful to the people of Moore Town in the Rio Grande valley, for not just permitting me to work in their community for several months, but also for their hearty participation in uncovering and understanding present and past attitudes to the river ecosystems in the care of the Maroons. Among them I must mention Colonel Wallace Sterling and Ivelyn “Ivy” Harris. Thanks also to Linette Wilks, Errol Francis and John “Cecil” Beckford from Millbank in Rio Grande valley for their time, help and encouragement. I also appreciate the help I received from David Brown and Vivian Crawford of the Institute of Jamaica. Thanks also to my Advisor Gonzalo Oviedo of World Conservation Union (IUCN) who offered literature, information and encouragement even before this study had taken a coherent shape. Thanks to my director Terry Williams who threw his full support behind this study throughout its duration. I also received generous field assistance from Fitzroy Grant and Aisha Bailey. Finally, none of this work would have been possible without funding from an Alcoa Foundation Conservation and Sustainability Fellowship at the World Conservation Union.
INTRODUCTION

This report is the product of seven months of participatory research among Jamaica’s Windward Maroons between February and September 2006. The research was primarily funded by an Alcoa Foundation Sustainability Practitioners Fellowship with IUCN (World Conservation Union) under the research theme: The Contribution of the Cultural and Spiritual Values of Indigenous Peoples to Protected Area Objectives. The project was designed to examine the values and attitudes of Jamaica’s Maroons to their freshwater resources and the implications of this for freshwater conservation in and around Blue and John Crow Mountains National Park. The study was located in the main Windward Maroon settlement of the Rio Grande watershed. Such work is essentially cross-discipline bringing together aspects of limnology, conservation, watershed management and anthropology. However, because of the limited time involved in designing and implementing this very participatory study, it was necessary to focus on issues directly related to the interface between the conservation of freshwater ecosystems and Windward Maroons.

The main foci of the study are therefore; 1) Maroon traditions, practices and attitudes to the freshwater habitats in their care, and 2) how these Maroon values have and can be used to communicate and implement effective conservation in the national park buffer zone and in the watershed. As the title suggests, this study is underpinned by the assumption that there are lessons to be learnt from the Maroons experience in water resource management. Therefore, I attempt to highlight the significance of my findings with respect to future conservation and development work in the park and Rio Grande valley. Hopefully, these lessons will find application in other circumstances.

BACKGROUND

Freshwater Conservation Imperative

Rivers have played a very important role in the development of human societies and economies for several millennia. Early settlements and civilizations were invariably situated along rivers which provided potable water, irrigation, transport and food from fisheries (Boon, Davies and Petts, 2000). Even today, rivers and freshwater systems in general are still critical and irreplaceable resources for human subsistence and economic development. While the importance of rivers is not an extraordinary insight, it has become necessary in recent decades to make freshwater conservation a global imperative. This is because even though societies have placed a high premium on securing supplies of clean freshwater, paradoxically they have generally pursued activities that impair or degrade the ability of ecosystems to provide that water (Revenga, Brunner, Henninger, Kassem, Payne, 2000; Millennium Ecosystem Assessment (MEA), 2005). The range of unsustainable activities is wide and includes chief offenders such as over-extraction of water, biota and sediments, water pollution, dams and impoundments, flow regulation and channelization (Boon et al., 2000).

Rivers and other freshwater ecosystems now rank among the most exploited and degraded ecosystems on the planet (MEA, 2005, Abell et al., 2007). However, the freshwater crisis has not garnered support proportional to the ecosystem services they provide and the absolute dependence of humanity on freshwater. In this report, the term freshwater conservation is used to describe the purposeful management of rivers and other aquatic ecosystems to preserve their ability to provide clean water for human societies and to serve as habitats for native plants and animals. This view of freshwater conservation is more holistic than the widespread one in Jamaica and other developing countries where freshwater conservation usually refers to managing...
water supplies for domestic use, industry and agriculture (Boon et al., 2005) or for human health (Pringle et al. 2000).

It is evident that a massive shift in how societies and individuals value and manage freshwater ecosystems is required to halt and reverse the trend of freshwater degradation. This shift must occur at all levels of decision makers; from domestic and agricultural users to legislators and policy-makers. This shift must also stress the view of clean water as more than a disembodied, detached commodity, but as a product of functional ecosystems which also provide food, recreation and other services. Additionally, new approaches and partnerships, beyond protected areas, must be formed to conserve functional freshwater ecosystems. Freshwater conservation must also be participatory, particularly because lowland areas are usually heavily settled and cultivated by domestic, municipal and industrial interests.

An essential pre-requisite for environmental change is shaping public attitudes and behaviour through effective environmental communication. Effective environmental education requires a thorough understanding of public attitudes and values so that messages can be tailored to the audience. This study is therefore the first of many steps in implementing successful in situ freshwater conservation in the context of a Jamaican watershed. It examines the values of the Windward Maroons who represent a unique subset of the Jamaican public. The Maroons are not just rural Jamaicans, they have a more than 300-year legacy of intimacy with forest and aquatic ecosystems and communal ownership of these resources. It remains to be seen if these conditions have led to significant differences in natural resource management between Maroons and other rural communities. Such a comparison is beyond the scope of this study, however, it should be investigated in the future.

Freshwater Conservation in Jamaica

As a Small Island Developing State (SIDS) Jamaica is completely surrounded by salt water, and relies greatly on limited, land-based freshwater. The name “Jamaica” is derived from the island’s Taino name, “Xaymaca”, meaning “land of springs” or the “land of wood and water”. The island still seems to be well endowed with freshwater resources, however with 1,512 cubic metres of water available per person per year, Jamaica is experiencing moderate “water stress” according to the Water Resources Authority (2000). The island ranks as globally important for endemic plants and other groups (NBSAP, 2003). This level of biological importance is probably not mirrored by aquatic ecosystems. A 1995 workshop on freshwater biodiversity in Latin America and the Caribbean ranked Jamaica as only regionally important for the conservation of freshwater biodiversity (Olson et al, 1998). This may be because of its oceanic biogeography resulting in a low diversity of large and socio-economically important aquatic organisms such as shrimp and fish. However, smaller invertebrates have exhibited very high rates of diversity and endemism, for example caddisflies (Botosaneanu and Hyslop 1998).

There is a growing awareness of the need for conservation of the Jamaica’s natural resources. Beginning with the Morant and Pedro Cays Act of 1904, several pieces of legislation have been developed towards the management and conservation of biodiversity and other natural resources. However, the nation is preoccupied with immediate socio-economic concerns such as poverty and crime reduction. Moreover, forest and coastal ecosystems have captured the very little attention paid to environmental and sustainability issues. Freshwater conservation efforts in Jamaica have focussed on upper watershed rehabilitation to secure water supplies for downstream settlements or to reduce the impacts of sediments and pollutants on coastal waters. Despite these efforts, no freshwater ecosystems are adequately managed or conserved (John, 2006). It is now necessary to

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1 This is calculated on the basis of the 2001 population of 2.7 million and Jamaica’s total exploitable water resources of 4,083.5 MCM/yr.
manage Jamaica’s rivers, wetlands and even caves as whole, functional ecosystems in order to protect their tangible and intangible provisional and regulatory services.

The Jamaica Ecoregional Plan (JERP) is an in-depth analysis of the areas and strategies necessary for conserving the island’s terrestrial, marine and freshwater biodiversity. Among the areas identified by the JERP as priorities for freshwater conservation is Rio Grande watershed which contains the largest river draining from the Blue and John Crow Mountains National Park (BJCMNP). The upper sections of the watershed are protected in the park. However most of the river, including the middle and lower reaches which contain the most significant freshwater biodiversity (Pringle et al. 2001), is unprotected. By protecting the entire Rio Grande, Jamaica will significantly enhance the protection of its freshwater ecosystems as part of its commitments under the Convention on Biological Diversity (John, 2006). However, there are few legal instruments for protecting rivers and it is not yet clear how much political support there is for developing legal instruments for specifically protecting rivers. Protected areas however are just one of the mechanisms available for protecting freshwater ecosystems; there are other conservation mechanisms such as easements, tribal reserves, community-managed and privately-owned parks. It is also obvious that freshwater conservation must be participatory, particularly because lowland areas are usually heavily settled and cultivated by domestic, municipal and industrial interests.

**Indigenous people and Conservation**

One of the most distinguishable communities in Rio Grande Valley is the Windward Maroons which are recognised by BJCMNP park management as “frontline stakeholders”. Jamaica’s Maroons could be regarded as “indigenous people” according to UN standards, in particular the Martinez-Cobo definition and the "statement of coverage" of the International Labour Organisation's Convention No. 169 on Indigenous and Tribal Peoples in Independent Countries, from 1989. “Indigenous peoples” is a term whose definition varies depending on the context. For this study, the International Labour Organisation’s definition, also used by IUCN, will be applied (ILO, Convention No. 169, concerning the working rights of Indigenous and Tribal Peoples, 1989):

“tribal peoples whose social, cultural and economic conditions distinguish them from other sections of the national community and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations, and to peoples who are regarded as indigenous on account of their descent from the populations which inhabit the country at the time of conquest or colonisation.”

Since the mid-1980’s environmental conservationists have acknowledged that much of the best preserved natural areas were occupied by indigenous peoples (Redford and Mansour, 1996). Not only do indigenous and traditional peoples occupy significant areas across the planet, 20 per cent by some estimates, but they possess considerable environmental knowledge and have evolved management systems compatible with their local environments over hundreds and sometimes thousands of years, (Oviedo and Brown, 1999). Additionally, Traditional Ecological Knowledge or TEK has been recognised as a legitimate field of environmental expertise (Freeman, 1992). A working definition of TEK is offered by Inglis (1993):

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2 "Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the society now prevailing in those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop, and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal systems" (Martinez-Cobo, 1987: paras. 379-381).
“TEK is a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment. Further, TEK is an attribute of societies with historical continuity in resource use practices; by and large, these are non-industrial or less technologically advanced societies, many of them indigenous or tribal.”

This recognition is based on the observations that TEK has been the basis of survival for many indigenous and traditional peoples and of local systems of resource management in diverse environments and contexts. TEK is different from scientific ecological knowledge in that it is not often quantitative, amoral or specialized. However, TEK has also been recognised to be relevant to contemporary resource management issues such as fisheries, forestry and wildlife management and environmental impact assessments (Freeman, op cit, Inglis, op cit). In the Caribbean context where there is very little published or otherwise documented information on the environmental history of freshwater ecosystems, such community-held knowledge can yield critical information for aquatic conservation (Pringle et al, 2000). The importance of this informal knowledge is heightened in Jamaica where excessive environmental degradation is coupled with the absence of reliable environmental baselines.

Jamaica was first permanently settled sometime around 600 A.D by the Arawakan-speaking Tainos. Since the 15th century the numbers and influence of these aboriginal peoples steadily declined in the wake of Spanish (circa 1494) and then English (~1655) colonisation and settlement. This colonisation primarily by the English resulted in the widespread alteration and destruction of natural habitats to support sugar cultivation, and subsequent waves of settlement by African and other peoples. Since then, agriculture, settlement and industrialisation have continued to degrade much of the island’s natural environment. It is therefore unlikely that there is any enduring TEK in the Jamaican society because of the historical discontinuity and relatively short generational span- except perhaps among the Maroons. The maroons are one continuous link between the original Taino inhabitants and the present day (Agorsah, 1994).

**Jamaica’s Maroons**

Maroons are essentially New World indigenous groups found from Texas in the U.S.A. to Brazil in South America. Maroons are characterised as communities comprising indigenous peoples and Africans who escaped slavery, formed viable communities within their territory and maintained their freedom by fighting off colonial attempts at control, (Agorsah, 1994). Jamaica’s Maroons are derived from several African and indigenous groups including: 1) Koromantes from the Ghanaian Gold Coast, 2) non-Koromantes from the slave coast, Volta to Benin, 3) Creoles, born either on plantations or in Maroon settlements and 4) Indians (Tainos and Mesquito indians brought in from Central America). The Maroons first formed during Spanish occupation when some slaves escaped to the rugged, hilly interior to join the remaining Indians. Many more slaves escaped as a result of the British invasion in 1655 and integrated into the existing Spanish Maroon settlements. Maroon numbers grew naturally, and, as more slaves escaped to join their numbers.

By the early 1700’s the Maroons became a problem for the British not only because of their raids on plantations but because their example of independence and courage might have inspired plantation slaves to rebel. Several laws were passed and battles fought in unsuccessful attempts by the British colonists to rein in the Maroons. The Maroons retreated further into inaccessible areas in the Blue Mountains and the Cockpit Country. After 80 years of conflict, the British requested peace. Two peace treaties were signed in 1739, one by the Leeward Maroons in Cockpit Country and the other by the Windward Maroons in Blue Mountains. Under this treaty,
the Maroons were granted possession of all the land they controlled and were required to return runaways and help the British suppress revolts. This treaty is regarded as the beginning of the “creolisation” of Maroon society in Jamaica (Bedasse et al., 1996).

Today, in spite of this creolisation, a distinct Maroon culture still exists in Jamaica particularly in the areas of food, music, dance and the linguistic relic of West African dialects known as “Kramanti” which is in decline (Bilby, 2005). The Maroons now occupy areas of high biodiversity value and own hundreds of acres of upland forests in Rio Grande Valley and Cockpit Country (Bedasse and Stewart, 1996; John and Newman, 2006). It was crucial that the Maroons know and understand the terrain, plant and animal life of the areas under their control during warfare in the seventeenth century because of their dependence on these lands for food, water and shelter. However, it is unclear how much of Maroon TEK remains today. Maroons have been frequently studied by academics, for example Carey, (1970); Agorsah, (1994); and Bilby, (2005). Few accounts offer detailed insights into the natural resource management practices of the maroons. Two publications stand out in this respect, Harris (1994) authored by (the former) Colonel Harris of Moore Town, and Bedasse et al (1996). Harris and Bedasse described Maroon usage of forest products and streams for survival particularly in the context of times long past such as during the struggle with the British when Maroons were not able to practice settled agriculture. Much of the past use of forests and rivers centred on the hunting and gathering on non-timber forest products such as wild hogs, various species of freshwater fish and shrimp, coney, cacoon (Entada gigas) and thatch palm.

This study arose out of my care for aquatic ecosystems and work in monitoring streams in Rio Grande and across Jamaica. It is rare to find un-impacted aquatic habitats in Jamaica, particularly in lowland areas. Consequently a situation exists where there are weak baselines or no baselines against which the current status of rivers and streams can be measured. The Maroons however have been paying close attention to the freshwater habitats on their lands for centuries. It is therefore possible that their years of observations can provide a healthier baseline for ecosystem monitoring and impact assessments (Freeman 1992 and Pringle, op cit.). The idea for this research first emerged during water quality monitoring in Rio Grande watershed and the national park in 2004. The Maroons were active programme participants and described some of their traditional water management practices. Many of these practices arose out of the Maroons’ peculiar circumstances; the need to safeguard food (fish and crustaceans) and water supplies, to keep concealed from colonial troops and avoid recapture.

This study started with the expectation of uncovering an indigenous Maroon freshwater conservation ethic and values that can inform and guide the management of habitats in the national park and the rest of the island. The premise was that there were established traditional management practices such as zonation of streams and springs for drinking, and washing and the regulation of settlement and fishing. The Maroons were also expected to have developed sustainable inland fishing techniques such as trapping and biodegradable poisoning, which may be invaluable to the park now since shrimp and fish numbers have plunged due to unsustainable river poisoning. More modern practices employed by Maroons include the construction of entombments at springs and water delivery infrastructure.
The main premise of this study is that the Maroon’s history of autonomy, semi-isolation and dependence on local natural resources would have fostered home-grown natural resource management systems and traditions. Whether or not these systems and traditions exist, there are implications for freshwater conservation in the park and watershed particularly where conservation outreach and education, community engagement, and ecosystems management are concerned.

The goal of this study is: To understand the relationship between Maroon values and practices and the integrity of freshwater ecosystems and to determine how the beneficial and negative aspects of these practices can inform management and conservation activities in Blue and John Crow Mountain National Park (BJCMNP) and Rio Grande Watershed. This goal was pursued through the following activities:

- Measuring and describing Maroon water values and water resource management practices.
- Examining the contribution of these values and practices to park objectives concerning freshwater ecosystem conservation.
- Recommending how traditional Maroon values, practices and governance structures can inform BJCMNP management and freshwater ecosystem conservation.
4) STUDY AREA

Blue and John Crow Mountains National Park (BJCMNP)
Established in 1990, Blue and John Crow Mountains National Park is Jamaica’s first declared protected area (JCDT 2005). The BJCMNP is a Category II protected area, defined as a protected area that is managed mainly for ecosystem protection and recreation. It is one of the nation’s most prominent natural areas, with major biodiversity, environmental and tourism values.
Approximately one third of the island’s remaining natural habitat (78,000 hectares) is in the park. BJCMNP is an important repository of Jamaican biodiversity and water supply. The park is representative of montane rain forest, and encompasses the upper sections of 10 of Jamaica’s 26 watersheds. These watersheds supply half of island’s water resources and are critical to the water supply of Kingston Metropolitan Area (the capital city) and all eastern coastal towns. The most prominent cultural heritage features of the BJCMNP are the Maroon sites.

BJCMNP’s objectives are grouped into six programme areas: 1) Conservation 2) Enforcement and Compliance 3) Education and Public Involvement 4) Recreation and Tourism 5) Monitoring and Evaluation 6) Governance and Administration. There is also a zonation and prioritization of areas for intervention (Figure 1). The parks activities are focused on broadleaf forest and headwater streams ecosystems. These stream ecosystems are intricately connected with downstream reaches and such a focus might be inadequate for their protection since several studies have demonstrated a bi-directional longitudinal connection that even downstream activities have significant effects on upstream communities (Pringle, 2001). Nevertheless these upland activities form a solid foundation for further protection and management of freshwater habitats.

Figure 1: Priority Management Intervention Sites in Blue and John Crow Mountains National Park, from JCDT (2005)
The 2005-2010 management plan for the park has identified the main threats to freshwater ecosystems, these are deforestation particularly of riparian zones, over-harvesting (including river poisoning) of fish and shrimps, and contamination from coffee cultivation and processing. As a result conservation objectives have been developed to directly mitigate these threats in the park and buffer areas through the following activities:

1. To protect threatened biodiversity by focusing on arresting further movement towards endangerment and extinction of the conservation targets (forest on shale and limestone, epiphytes, freshwater ecosystems, forest birds, the Jamaican Coney, Yellow Snake, and Giant Swallowtail Butterfly).
2. Rehabilitating at least 200 acres of degraded area within the priority areas for management intervention,
3. Creation and maintenance of a 50 m (25m on each side) riparian forest buffer along headwater streams, and
4. Promoting research that will inform park management, but will not threaten the resources.

The on-the-ground conservation activities are complemented by the enforcement of park and forest legislation, environmental education and the development of sustainable livelihood options which are related to engaging the resource users and other stakeholders. A detailed stakeholder assessment of BJCMNP has identified the Windward Maroons as frontline stakeholders which are critical to the success of conservation strategies.

**Rio Grande Watershed**

The Windward Maroons are mainly settled in the Rio Grande valley in the parish of Portland. The Rio Grande watershed in northeast Jamaica is over 30,000 hectares in area and has a rich natural and cultural heritage. The Rio Grande, for which the watershed is named, ranks as Jamaica’s most voluminous river and is one of the main rivers draining the Blue and John Crow Mountains National Park (BJCMNP). The watershed has been identified as a national conservation area for Jamaica’s freshwater biodiversity and is a priority for protection because it is less degraded than other large watersheds in the Blue Mountains. Rio Grande rivers and streams are critical habitats for many endemic and migratory freshwater species, including migratory mullets, eels, gobies, migratory shrimp, snails and numerous aquatic insects endemic to Jamaica.

The Rio Grande area is sparsely settled with approximately 25,000 inhabitants in small linear settlements along the river and its larger tributaries. Upper watershed communities (i.e. further south) number about 10,000 persons and are relatively isolated from urban centres primarily because of the poor road network. BJCMNP buffer communities, including the indigenous Windward Maroon group, are intimately connected to the Rio Grande; they depend on the river and its tributaries for most of their water needs (drinking, washing and irrigation), food, recreation and ecotourism activities. Some communities have set up their own water delivery systems using entombments, pipes and other infrastructure. People in the Rio Grande area are mostly agriculturists, with bananas, coffee and vegetables being the main crops. Several parties are also involved in the growing ecotourism industry. Freshwater ecosystems are key components of Rio Grande culture, with freshwater fish, shrimp and snails being a significant part of the diet.
Moore Town

This study was focussed on Moore Town, the main town of the Windward Maroons. Moore Town is one of 10 priority management intervention sites in the park’s buffer zone carded for reforestation and other conservation activities (Figure 2). Moore Town was established in 1781 by Grandy Nanny, leader and heroine of the Maroon struggle against the British (Harris, 1994). The Windward Maroons had their headquarters high in the mountains of Rio Grande watershed at Nanny Town in an area that was virtually inaccessible to cumbersome British forces. After 80 years of conflict with the maroons, in 1734, the British dragged swivel guns up the south side of the mountains and bombarded the settlement, scattering the maroons and forcing them south. Still the British could not flush them out, and five years later a peace treaty was signed giving the undefeated Maroons a semi independent status that they retain today, as well as five hundred acres of land at the damaged Nanny Town site. Some years later, Grandy Nanny requested additional lands to begin a “Moretown”. Through a series of errors, the name of the settlement was changed to Moore Town.

The Maroons acquired much more land throughout Rio Grande Valley through purchases and their holdings are now estimated to be more than 5,000 acres (>2000 hectares), (Bedasse et al, 1996). Moore Town is 515 hectares in size and situated in the upper reaches of the Wild Cane River a major tributary of Rio Grande. It is a good example of how military security and safety determined the location of Maroon settlements. The settlement is bowl-shaped with one access road, and the river flowing right through the centre. The dwellings are located along the valley walls and are accessible by footpaths leading up from the road and river.

Figure 2: Study area showing Maroon settlements
5) **RESEARCH METHODS**

**Introduction**

Past studies on indigenous and community based management of natural resources have relied heavily on participatory and other research methods from the social sciences. This study follows the trend with an interactive and participatory methodology. Participatory techniques are varied but are characterised by their collaborative approach to gathering information about local conditions (Jackson and Ingles, 1998). Whereas conventional research methods emphasise data-gathering through formal instruments such as questionnaires, participatory methods focus on direct and interactive learning from local peoples. Participatory research methods are used in interviews, focus groups discussions, workshops, sketch mapping and passive observation (Becker and Ghimire 2003, Jackson and Ingles, 1998).

One common and necessary attribute of participatory research is the time involved in introductions, building rapport and gaining the trust of the research subjects and extracting the information from them. In this case, permission was requested of the leader of the Maroons in Moore Town, Colonel Wallace Sterling before and during the project design. It was also important to manage the expectations of the Maroons from the outset of the project to ensure that there were no misplaced anticipations of financial or other rewards.

The main research methods used in this project were focus group meetings and interviews. Prior to the commencement of fieldwork, relevant secondary data was collected on the socio-economic attributes of the maroons and water management issues in the buffer zone of BJCMNP. This helped in shaping the design of the project methodology and informed strategies that should be taken into consideration. Primary data collection was conducted between May and August 2006.

Detailed research questions were drafted and used to guide interviews, group discussions and the literature search. These research questions, which are presented in Appendix 1, are focussed on the following areas:

- How Maroons have used and now use the springs and streams in their care
- The importance of rivers and springs in Maroon culture
- Environmental problems and concerns with respect to Maroon-controlled rivers and springs
- Past, present and future actions to manage freshwater ecosystems

Early in the study, it was necessary to draft indicators to aid in measuring the Maroon community’s values with respect to water resources. These are listed as follows:

1. Ranked/Prioritised uses of the river
2. River biodiversity knowledge and values
3. Prioritised problems with the river
4. Conservation awareness and practices
5. Perceptions of water governance, traditions and cultural heritage

Four project assistants were engaged to facilitate various aspects of the work. One of these was a social scientist who helped to design the methods and to facilitate the Participatory Learning Activity (PLA) sessions with the youth and children. The other three were young people from Moore town who were hired to assist with meetings and interviews. Interviews were held with Maroons and other resource persons from national park, throughout the study. A list of interviewees is presented in Table 1.
Focus Group methods

Five focus group discussions were held with four demographic groups in Moore Town. These meetings included a joint Maroon Council and Jamaica Agricultural Society (JAS) meeting, the youth 12 to 21 years, women (mothers from the Parent Teachers Association) and children (four to eleven years old). A facilitator’s guide was developed to outline questions in areas of traditions and cultural practices, and to keep the group discussions focused (Appendix 2).

PLA is a mutual learning process toward a common goal. It is meant to enable persons to conduct their own analyses and own the information generated. PLA has three basic elements; the methods, the attitudes and inclusive participation (Facilitation Skills in Planning, 2001). PLA is a method that gives persons a guided approach to assessing and dealing with their issues, best practices concerns and possible solutions. It is primarily a community driven approach to understanding social phenomena. This was useful with the children because it provides visuals and it easy to understand. Three PLA forms were used, priority ranking, problem tree analysis and resource mapping.

1) Priority Ranking (Research Question 1)
Priority ranking was done by asking participants to list all uses of the river and voting on the relative importance of each use (Figure 3). Participants were encouraged to discuss their suggested rankings and to arrive at a final rank by consensus. The young people were divided into two groups, male and female in order to determine and understand whether young men and women viewed the resource differently.

2) Problem Tree Analysis (Question 3a)
This tool was used to help participants analyse the existing situation with rivers and springs by identifying the major problems and their main causal relationships. The output was a graphical arrangement of problems differentiated according to causes and effects joined by a core or focal problem. A Solution Tree was also developed to help participants identify solutions to the problems by examining the causal relationships between the problems and their underlying factors.

3) Mobility Map (Research Question 2)
A mobility map is often used to identify the patterns of movement of different sectors/groups in a community. However in this study, the mapping exercise was designed to help identify the main areas of resource use. A base map was obtained from Agorsah (1994) and verified by a walk-through Moore Town with local residents. Participants were then asked to locate areas...
used for the main activities determined in the priority ranking. Paper cut-outs were provided to represent specific uses.

This exercise was only partially successful because of the wide differences in map reading skills among the participants and the reluctance of some groups to divulge detailed information on locations. Consequently, even though participants agreed on the existence of springs and fishing spots for example, there were sharp disagreements on where to locate these on the map.

**Interviews**
Interviews were held before and during the study to obtain in-depth information on maroon traditions. Eleven persons representing maroons, maroon researchers and BJCMNP personnel were interviewed (Table 1).

**Table 1: List of interviewees**

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Position/Title</th>
<th>Date(s) Interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linette Wilks</td>
<td>Coordinator, Bowden Pen Farmers Association</td>
<td>14\textsuperscript{th} February, 2006</td>
</tr>
<tr>
<td>Wallace Sterling (Snr)</td>
<td>Maroon Elder</td>
<td>24\textsuperscript{th} May, 2006</td>
</tr>
<tr>
<td>Col. Wallace Sterling</td>
<td>Colonel of Moore Town Maroons</td>
<td>14\textsuperscript{th} February and 25\textsuperscript{th} April, 2006</td>
</tr>
<tr>
<td>David Brown</td>
<td>Senior Research Fellow, African-Caribbean Institute of Jamaica</td>
<td>21\textsuperscript{st} March, 2006</td>
</tr>
<tr>
<td>Hazel McLune</td>
<td>Field Research Officer, African-Caribbean Institute of Jamaica</td>
<td>23\textsuperscript{rd} March, 2006</td>
</tr>
<tr>
<td>Vivian Crawford</td>
<td>Executive Director, Institute of Jamaica</td>
<td>10\textsuperscript{th} April, 2006</td>
</tr>
<tr>
<td>Colonel Harris</td>
<td>Retired Colonel of Moore Town Maroons</td>
<td>24\textsuperscript{th} May, 2006</td>
</tr>
<tr>
<td>Shauna Lee-Chai</td>
<td>Science Officer, Blue and John Crow Mountains National Park</td>
<td>11\textsuperscript{th} August, 2006</td>
</tr>
<tr>
<td>Marolyn Lucy Gentles</td>
<td>Education and Outreach Officer, Blue and John Crow Mountains National Park</td>
<td>15\textsuperscript{th} August, 2006</td>
</tr>
<tr>
<td>Susan Otuokon</td>
<td>Executive Director, Jamaica Conservation and Development Trust</td>
<td>6\textsuperscript{th} September, 2006</td>
</tr>
<tr>
<td>Patti Bedasse</td>
<td>Community Development Consultant and author of <em>The Maroons of Jamaica: One with Mother Earth.</em></td>
<td>30\textsuperscript{th} September, 2006</td>
</tr>
</tbody>
</table>

**Validation meetings**
In late July, a meeting was held with the Moore town community in order to validate the findings of the focus groups and most of the interviews. This validation meeting was also used as an opportunity to gauge the responsiveness of the wider community to continued conservation efforts.
6) RESULTS:

Maroon water values
It was necessary to clarify the use of terms from the start of the study because there were shades of differences between the terms the Maroons and the researcher used to describe the aquatic habitats in Rio Grande. Rivers (called “ribba” or “riva” in Maroon stories and songs) includes small streams (>2 metres in width), large streams and rivers as large as Rio Grande (>100m wide). The Maroons use the word “springs” to refer to small steep rivulets, with thin sheets of water flowing over large slabs of rocks, habitats known in limnology as “madicolous” environments. “Streams” are understood by the Maroons to be rapids or riffles which are sub-habitats within rivers.

This research also tried to clarify the origins and ownership of the river in Moore Town. The Maroons are completely responsible for the Wild Cane River (which is called Negro River on national maps). The river starts in what they refer to as “the Forest” which is the Blue and John Crow Mountains National Park. The river flows in a north- north-westerly direction through Moore Town and then joins the Rio Grande in Seamans Valley. Rio Grande flows through Maroon and non-Maroon communities.

1. Prioritised uses of rivers and springs
Maroon elders said that the layout of Moore Town with the river in the middle was a strategic decision by its founders and see the river as a central part of Maroon life. According to the focus group participants, the river and springs are utilised less than before and in different ways. Since the 1960’s, there has been a piped water supply from Maroon-owned springs in Moore town starting with communal stand pipes. Gradually in the 1970’s and 1980’s, piped water was supplied to individual homes. This study identified 13 utilitarian and cultural values of the river and springs among the Maroons of Moore Town.

Table 2: Priority ranking of Maroon uses of rivers and springs as per 4 demographic groups.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Youth (12-21 years)</th>
<th>Adult (&gt;21 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Bathing</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Drinking</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Cooking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laundry</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Fishing</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Swimming and playing</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Tourism</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Garbage Disposal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravel and sand</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Irrigation</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Defecation</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Wash vehicles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baptism/ healing</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Transport route[]</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Adult Males (Maroon Council and local Jamaica Agricultural Society branch)
**Adult females (24 members of Local PTA)
\[\] This was an important function during conflicts with the British colonists (Bilby, 2005)
Although a piped water supply was established in Moore Town over 30 years ago, today, the main uses of the river are domestic activities that can easily be done at home with piped water such as bathing, drinking, cooking and laundry. The focus groups all said that using piped water was more convenient than using the rivers and springs; however, they appreciated having the option of using these natural systems. The interviews uncovered details about these activities as follows:

- **Bathing**: This is done in the river for fun and out of convenience for example after washing clothes. In the past this was more common because there were many swimming holes and pools within the river. Larger, deeper pools were used by adults and were out of bounds for children. The young children pointed out that they prefer bathing in the river which is cooler and feels cleaner than bathing at home.

- **Drinking**: There was unanimous agreement that apart from tap water, Moore Town Maroons only drink water from springs. Many interviewees and focus group participants said that they preferred spring water to tap-water and that spring water was more reliable because it was always clean. Many persons still collect spring water using rolled leaves to funnel water off the rocks (Figure 6). In the past, spring water was collected by calabash gourds *Crescentia cujete*, a species native to the Caribbean Basin. Bamboo was introduced to Jamaica in the 1700’s (Proctor, pers. comm.) and the calabash was eventually replaced by bamboo containers. During the study several young persons were observed collecting spring water at the roadside using recycled plastic bottles. Rain water, although abundant in Moore Town, is not used for drinking and is described as being “bitter”.

- **Fishing**: This activity was very important to the males, young and old, some of whom reported that they fish almost every weekend. The Maroons recognised that there are differences between the fauna of the different systems (for example the Wild Cane River versus the Rio Grande main stem versus springs) and the sensitivity of aquatic fauna to their activities. Maroon fishing activities are described in more detail in the following section.

- **Tourism**: Only the young people saw this activity as important. They said that tourist visits (mostly foreigners) to Nanny Falls (Figure 9) is a source of income. However, only a few of the young males have ever earned money from providing tour guide services.

- **Gravel and sand**: Gravel and sand are used for mixing concrete and the large rocks are used for building walls and lining cesspits. Interestingly, it was sand and gravel harvesting that resulted in conflict between park rangers and Maroons in the past (Bedasse pers. comm.).
Irrigation: This was not seen as an important activity because the rainfall in Moore Town is adequate for most types of agriculture. However, the vegetable farms do use some extra water in the dry season.

Defecation: This was mentioned by children and young people as a regular but unpleasant use of the river. However in the community validation meeting adults seemed offended when this was presented to them.

2. River biodiversity values and knowledge

The Maroons spoke of plants and animals that are recognised and/or harvested from in and around the river. Much of the biodiversity knowledge was fishing-related however there is one non-edible species which is used to indicate the suitability of springs for drinking water. Several species are harvested for food to varying degrees by Moore Town residents. These include eight species of fish, at least three species of shrimp, and one snail species (Table 3). The elders referred to the hognose mullet (*Joturus pichardi*) as a treat and an exceptionally tasty fish with cartilage instead of bones. The adult men and some of the youth were aware of the habits of some of these species. For example many people spoke of annual upstream migrations of the *Sicidium* gobies but noted that these events had now become irregular. Some Maroons said that the crevices between rocks were important habitats for fish and shrimp and that the pools overhung with forest trees were good for catching shrimp and fish.

![Figure 7: Nanny Falls, the main natural attraction in Moore Town. Colonel Wallace Sterling is in the foreground. K.John](image)

**Table 3: Species harvested from Wild Cane and other Rio Grande rivers**

<table>
<thead>
<tr>
<th>Species name</th>
<th>Vernacular Name*</th>
<th>Common name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Agnostomus monticola</em></td>
<td>Cutter, cock-a-belly,</td>
<td>River/ mountain</td>
<td>This is a well-known and widely used pelagic, migratory fish found in and around the Caribbean Basin.</td>
</tr>
<tr>
<td></td>
<td>calli-peypa</td>
<td>mullet</td>
<td></td>
</tr>
<tr>
<td><em>Joturus pichardi</em></td>
<td>Hognose</td>
<td>Hognose mullet</td>
<td>This is a popular fish that has become extremely rare in Rio Grande and Wild Cane except in Banana River near the deserted site of Nanny Town.</td>
</tr>
<tr>
<td><em>Gobiomorus dormitor</em></td>
<td>Mudfish</td>
<td>Bigmouth Sleeper</td>
<td></td>
</tr>
<tr>
<td><em>Awaous tajasica</em></td>
<td>Sandfish</td>
<td>River Goby</td>
<td></td>
</tr>
<tr>
<td><em>Pomadasys crocro</em></td>
<td>Grunt</td>
<td>Burro Grunt</td>
<td>This is a marine species, known to inhabit rivers (up to 100 miles from the sea).</td>
</tr>
<tr>
<td>Species name</td>
<td>Vernacular Name*</td>
<td>Common name</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>TBD</td>
<td>Jacks</td>
<td>TBD</td>
<td>It is unclear what species of fish the common name “Jacks” refers to.</td>
</tr>
<tr>
<td><em>Sicidium plumieri</em></td>
<td>Suckstone, cocho</td>
<td>Goby, Green stream goby</td>
<td>Harvested as juveniles during mass migration events</td>
</tr>
<tr>
<td><em>Anguilla rostrata</em></td>
<td>Eel</td>
<td>American eel</td>
<td>This migratory fish is common in the Rio Grande but not very popular for food as many people are afraid of it.</td>
</tr>
<tr>
<td><em>Macrobrachium carcinus</em></td>
<td>Crayfish</td>
<td>shrimp**</td>
<td>This shrimp species is especially favoured for food because of its large size and tastiness. It is the main target in traps, spear fishing and river poisoning.</td>
</tr>
<tr>
<td><em>Macrobrachium crenulatum</em></td>
<td>Black Janga</td>
<td>Pubescent hand shrimp**</td>
<td></td>
</tr>
<tr>
<td><em>Atya lanipes</em></td>
<td>Janga</td>
<td>Shrimp**</td>
<td></td>
</tr>
<tr>
<td><em>Neritina punctulata</em></td>
<td>Bussu</td>
<td>snail</td>
<td></td>
</tr>
</tbody>
</table>

* Name given by the Maroons

** There are several species of shrimp in the Rio Grande, eight according to Hunte (1976). Most of these are migratory with estuarine phases early in their life cycle.

Table 4: Non-food aquatic and semi-aquatic species used by the Maroons

<table>
<thead>
<tr>
<th>Name</th>
<th>Species</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wehdu</td>
<td>Gyrinidae family</td>
<td>This is a small beetle commonly called ‘whirligigs’ whose presence is believed to indicate river or spring water that is suitable for drinking. “Indicates life in the water”. This is very useful during hunting expeditions.</td>
</tr>
<tr>
<td>Dy-do</td>
<td>Decapoda</td>
<td>Small type of shrimp all but disappeared from Maroon lands. It is colourful and appears to be striped.</td>
</tr>
<tr>
<td>Rose apple</td>
<td><em>Syzygium jambos</em></td>
<td>A plant introduced to Jamaica from the Pacific islands, very common along riverbanks across the island. It is used to make sinking pots. Maroons claim that fish and shrimp congregate below overhanging trees when the fruit is in season.</td>
</tr>
<tr>
<td>Bamboo</td>
<td><em>Bambusa vulgaris</em></td>
<td>Another plant introduced to Jamaica during the 1700’s. It is very common in Rio Grande valley where it forms dense almost uncontrollable stands. It is very common along riverbanks and deforested patches across the island and is regarded as an invasive species. It is used to make fish pots, sinking pots, water carriers and floating rafts in Rio Grande.</td>
</tr>
</tbody>
</table>

Several fishing methods were described during the interviews and focus group meetings and persons were clear as to which methods were acceptable in the community and the level of
specialised skills required. These fishing methods and implements are described in Table 5 and Figure 8. One interviewee said that in maroon science, no fishing implement was necessary as all on had to do was dive and take what one wanted by hand (“you dive headlong and collect what you want”).

Table 5: Fishing implements and methods employed by the Maroons

<table>
<thead>
<tr>
<th>Fishing implement/method</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long lance (joonga)</td>
<td>Described in Agorsah (1994). This is a blade attached to a long pole. Fish were speared from rocks and boulders. This is most effective with larger fish and crayfish. This technique required very good coordination and accuracy.</td>
</tr>
<tr>
<td>Fish Pot</td>
<td>This is a cone-shaped trap made of bamboo, which is baited. This is used to catch crayfish, and fish such as mullets etc. (By Jamaican law, the trap must be specifically approved for the river) Figure 8.</td>
</tr>
<tr>
<td>Sinking Pot</td>
<td>A tear-shaped baited trap made of rose apple and withe (pronounced “whyss”) cords. Used to catch fish in deep pools. (By Jamaican law, the trap must be specifically approved for the river) [Figure 8]</td>
</tr>
<tr>
<td>Striker</td>
<td>A long spear with a four-pronged end which is used to spear crayfish. [Figure 8]</td>
</tr>
<tr>
<td>By Hand</td>
<td>Small crayfish are harvested from under rocks and crevices this way.</td>
</tr>
<tr>
<td>Fish Gun/ Spear gun</td>
<td>Elastic-powered gun used to spear fish underwater, used with mask and snorkel.</td>
</tr>
<tr>
<td>Bootah</td>
<td>This device was described as similar to a bow and arrow and like a short knife</td>
</tr>
<tr>
<td>Short lance</td>
<td>Described in Harris (1994) as a short knife used both in hunting wild boar and in diving for fish and crayfish.</td>
</tr>
<tr>
<td>Basket</td>
<td>Wide-mouthed baskets made from bamboo and rose-apple are used to scoop up small shrimp and migrating gobies from shallow pools. [Figure 8]</td>
</tr>
<tr>
<td>*Poisons</td>
<td>“Saranam” and other plant material.</td>
</tr>
<tr>
<td></td>
<td>Agrochemicals: This type of poisoning became frequent with the introduction of coffee, banana and other cash crops to the valley.</td>
</tr>
<tr>
<td>*Dynamite</td>
<td>This is used very infrequently in Rio Grande and not used at all in Wild Cane River. It is usually a technique frowned upon but used to fish in deep inaccessible pools.</td>
</tr>
<tr>
<td>*Electricity</td>
<td>Live wires and bamboo poles are used to stun fish and shrimp for easy harvesting.</td>
</tr>
<tr>
<td>Mini-dams</td>
<td>Shallow (≤30cm) and temporary dams are constructed from rocks and boulders across the river bed. The ‘owners’ of the dams place fish pots between the narrow breaks in the dams</td>
</tr>
<tr>
<td>Baiting</td>
<td>The most common bait used by Maroons is roasted coconut especially for catching crayfish. Maroons bait pools with bits of roasted coconut and return in the evening to lance and strike the crayfish that congregate around the coconut.</td>
</tr>
</tbody>
</table>

* Illegal fishing methods according to environmental laws (Wild Life Protection Act, 1945)
3. **Prioritised Problems related to the river**

According to older interviewees and in Bedasse *et al* 1996), the river was once “teeming with fish, and crayfish”. All focus groups pointed out that the river has changed drastically for the worse in the last two decades. This includes changes in its hydrology, morphology and biology. The youths and adults said that the river had become drier in the dry season. They complained that the channel now had so much sediment (coarse sand, gravel and rocks) that swimming holes had disappeared. They believed that the sedimentation was caused by erosion from the surrounding land. Furthermore, the adult men said that the sedimentation in turn reduced fish and crayfish populations because the sediment filled in crevices between rocks and reduced the number of hiding places for fauna. All groups said that there were less fish and shrimp in the river than before and that many factors listed below were responsible for this drastic decline.

The Maroons attributed these problems to their own actions as well as external actors. For instance, they admitted that river degradation set in with the intensive banana cultivation which they pursued in the 70’s and 80’s. One elder said that he noticed the decline in river life with the increase in cash cropping in the mid-1960’s. Adults also said that solid waste was hardly a problem for them until the 1980’s when plastic packaging became widespread in Jamaica. However, some persons reported that fish kills and the decline of the river fishery began with the Forest Industries Corporation (FIDCO) operations of the 1980’s when natural forest was cleared...
for commercial pine plantations and herbicides were used to destroy the dense bamboo stands on Rio Grande slopes.

Table 6: The main environmental problems that affect Wild Cane River and Rio Grande.

<table>
<thead>
<tr>
<th>Top problems</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>River pollution</td>
<td>This was identified by all groups as a serious problem. This includes solid waste, human waste, washing spray cans in the rivers and agricultural runoff.</td>
</tr>
<tr>
<td>Over-fishing</td>
<td>This was identified by all groups as a serious problem. Increased fishing pressure, inappropriate fishing methods: river poisoning and electricity fishing (using live wires and bamboo poles)</td>
</tr>
<tr>
<td>Sedimentation</td>
<td>The young and adult men identified this as a serious problem associated with the filling-in of swimming holes and hiding places for fish and crustaceans. Landslides and agricultural runoff were identified as the main causes.</td>
</tr>
</tbody>
</table>

4. Conservation practices and awareness

The focus group participants were not aware of any specific practices used to protect or conserve the river. Two interviewees, one of which is Maroon, spoke of past approaches and an old code of conduct whereby Maroons behaved in a way to preserve the utility of-and life within- the water. For example, there was an unwritten rule that one should be careful what one does in the stream at any point because someone might want the water to drink and that one should never throw anything, garbage or trees in the river. Additionally, there was an informal zoning system; some activities such as drinking water collection and washing were only allowed in certain areas. The general consensus was that this informal system had broken down.

The group discussion participants were notably forthcoming with proposed solutions to current problems and expressed their willingness to work on these problems. Their suggestions are listed below.

- Implement garbage collection system
- Community to enforce “No Poisoning” Rules
- Closed season to allow the system to recover
- Agricultural groups to implement “Safe Handling” of agrochemicals
- Removal of excess sediment from the river
- Forest buffer along river- trap sediment and chemicals, and to encourage crayfish
- Promote trapping among other things as an alternative to poisoning

5. Water governance and stewardship, traditions and cultural heritage

The Maroons asserted that “the river belongs to everyone”. They have inherited a communal system of land ownership in which the use rights for resources such as the river and springs are controlled by the group. Consequently there are no restrictions placed on legitimate uses of the
river although practices such as poisoning and dynamiting are frowned upon. It was however difficult to determine rules of use for the river, whether these rules are enforced and by whom. The youth and young women regarded the Maroon Council as the final arbitrator in issues concerning the river although they did not regard them as managers. The former Colonel Harris spoke of past conflict resolutions concerning the river being resolved by consensus. However no one recalled a system for sanctions outside of public rebuke at council meetings. Only the children spoke of current disputes involving the river. For example, there was one case where persons were said to pollute the river with farm and household wastes as an act of revenge on persons downstream.

The Maroons were very involved in setting up the infrastructure: entombments, pipes etc for the water supply for the community in the 1960’s. There was very little awareness among the children, youth and women about how this system is maintained. The council however is responsible for maintaining the entombment and for chlorinating the water from the spring, no young people are involved. According to Colonel Harris, the water supply is derived from (what sounds like) “Salt Packee” Spring which at one point supplied other communities in Rio Grande Valley as far south as Windsor settlement. When asked about the importance of protecting the river for downstream communities, meeting participants said that it was important but not presently considered.

The literature suggests that much of Maroon cultural forms are derived from the river. Bilby (2005) cites the verses of several songs in which the river is part of the Maroons survival strategy. Hence there is the saying that “if yuh follow me, you follow river” in reference to the old Maroon practice of travelling along the rivers in order to avoid the colonists’ tracking dogs. Separate from fishing activities, the river is also significant in Maroon food-ways. Hunting the hognose mullet was once a special occasion because of the tastiness of the fish, “the best eating fish in the world”, and was accompanied by storytelling (Harris, pers. comm.). The river was also important for the processing of cacoon seeds, (Entada gigas) one of the few native sources of carbohydrates available from the forest. The seeds of the cacoon vine are edible but only after processing to remove toxins. The seed was processed by roasting the kernels and then soaking them in the running water of streams for a few days.

It is important at this point to note that several interviewees and focus group participants felt that Maroon culture is on the decline and will be lost. They lamented that traditional Maroon culture is not being transmitted to young people and that long-standing unresolved conflicts within the Maroon community are threatening it cohesion. Maroon heritage is orally transmitted, and in this context inter-generational communication is necessary for the survival of the culture. Several reasons were given for this state of affairs; 1) some aspects of Maroon culture were seen as a hindrance to development (Bedasse), 2) some elders are afraid that Maroon knowledge will be passed on to non-Maroons through intermarriage and 3) the elders believe that the younger maroons do not take the culture seriously.

Two interviewees said that in the last few decades, many Maroon practices were thought to be backward and were hindering the progress of the community. They said that “people used to get hurt” in maroon science and that none of the children were doing well in school because the maroons were using science against each other. There was therefore a deliberate constriction of the transmission of many if not most aspects of the maroon culture. One interviewee said that this council decision was taken in the 1980’s. Maroon science beliefs and practices have been a closely guarded secret for centuries and are characterised by supernatural phenomena, possession with ancestral spirits, and the use of herbs (Bilby, 2005). It is therefore likely that many persons in the community regarded intermarriage between Maroon and non-Maroon persons as a threat to the security of such secrets. Former Colonel Harris described the persons who poison the river as...
having Maroon *blood* but not being true Maroons. This suggests that a distinction is made between full and mixed maroons.

The young persons complained that the elders have told them nothing about the old rituals and practices while some of the older maroons described the youth as not being serious about Maroon culture. Some interviewees said that there was much animosity between the generations. According to Bedasse (1996), the elders are displeased with the attempts of the youth to copy their music and dancing, describing their sounds as “too English”. Consequently, it has been observed that Moore Town youth do not participate in cultural displays.

The Maroons in the focus groups did not collectively express much interest in mapping features of the landscape and freshwater systems (two youngsters later said that they were interested in developing the map). However they identified three areas in Wild Cane River that have cultural significance; Sanda, Mango Hole and Buddo Was-Was. Sanda is a deep pool that has been around for centuries. Several interviewees said that the pool has healing properties which was welcomed during the long conflict with the British. Persons injured in battle went to Sanda for bathing and were healed. It was also said that persons injured during Maroon “science” rituals would also become whole by swimming along Sanda. Up to 20 years ago, persons about to get married would bathe at Sanda very early in the morning (~4:30AM) of the wedding. This was done simply out of tradition and very early because there was more privacy. Mango Hole is another pool used for healing. It was mentioned by one interviewee as a spiritual place which was used for healing after science works (i.e. after they cut themselves with machetes).

There were widely differing reports about the other important spot, Buddo Was-Was. According to Crawford, Buddo Was-Was is used for baptisms (usually 5:30AM on a Sunday morning), and children used to (or still do) swim there during lunch break from school. However, other persons said that the spot was simply used as an area to wash off after defecation.

Another, aspect of the Maroon river culture is that of river stories. The most famous is the story of Nanny’s Boiling Pot. British soldiers were warned to beware of a large boiling pot, under which there were no flames in which the Maroon heroine Nanny would kill their comrades. This “boiling pot” was later explained in Bilby (2005) as the turbulent confluence of the Stony River and Rio Grande along which, there was a narrow path. According to some accounts, Nanny placed soporific herbs in the river; soldiers walking on the path above the confluence would become drowsy and fall into the river. The young people also spoke of stories about a two-headed fish at the bridge and ghost crayfish. One of these phantom river forms, a ghost fish, spoke to the healing lady, warning that it would “take” one of the young men if the youth persisted in disturbing the river.
7) DISCUSSION AND CONCLUSIONS- IMPLICATIONS FOR FRESHWATER CONSERVATION IN BJCMPN AND RIO GRANDE

“In the end, we will conserve only what we love, we will love only what we understand, we will understand only what we are taught” Baba Dioum, Senegalese Conservationist.

The Maroons occupy a unique position in Jamaica because of their long-standing stewardship and communal ownership of land, forests and streams. This six-month study offered a snapshot of the Maroons and their water values and practices and served as a preliminary exploration of water-related issues. Further interaction with the Maroons -and the people who work with them- will be required to flesh-out the sociological and environmental issues identified and to further develop future directions for natural resource management and conservation in the Maroon community. Many researchers have mined Moore Town in the past and have extracted information but have not implemented any long lasting initiatives. This research has prompted requests from the Maroons themselves for help in continuing conservation and development work in their community. The prioritisation exercise highlighted a very practical and mundane approach to water resources that lacked much sentimentality. This suggests that any conservation efforts involving the Maroons must consider the utilitarian value to the group before moral and stewardship issues and find and articulate links between Maroon culture and biodiversity conservation. The findings and implications of the results are discussed below.

Maroon values and practices in flux

This study identified several positive aspects of Maroon culture that can underpin and advance conservation initiatives. The main Maroon uses of the river; bathing, drinking, cooking, laundry, fishing, swimming and tourism, all require clean water and a healthy ecosystem. Similarly, the conservation of the freshwater ecosystems, as defined in the introduction, necessitates good water and habitat quality, and intact hydrological and biological regimes (Silk and Ciruna, 2005). There is therefore much common ground between the stated values of the Maroons and conservation values. However the Maroon values do not appear to match their practices; all participants in the study described the river as being in much worse condition than it was up to 20 years ago because of their and other people’s actions. At the final community meeting all participants said that they are dissatisfied with and inconvenienced by the condition of Wild Cane River and Rio Grande. This dissonance indicates that maroon values are not translated into community action. This is probably because their values were never developed into an indigenous management system. Instead these unwritten and “understood” codes of conduct promoted the care of the river, not so much for its own sake, but of a resource that was critical for the survival of the community. Thus the river was protected by the collective conscience of the community rather than organized behaviours and taboos. The river is no longer perceived to be a critical resource. Therefore community “protection” was reduced as the dependence on river water declined with infrastructural changes such as the introduction of piped water supply.

However, the reduced dependence on the river alone cannot account for the abuse of rivers and springs on Maroon lands. Even though an indigenous natural resource management system was not properly formed among the Maroons, it is likely that community cohesion and the sense of ownership would have sustained the ‘code of conduct’ towards natural resources. Interviewees said that the overall trend has been one of loss of cultural identity or a collective sense of the intrinsic –not nominal- difference between Maroons and non-Maroons. It is likely that in the past when everyone was dependent on the river, it would have served as a focal meeting area.
facilitating interaction between community members as they collected water for the household, washed, bathed or fished. Under those conditions, it would have been difficult for objectionable behaviours such as dumping garbage in the river, or using poisons for fishing to go un-noticed or unpunished. This kind of camaraderie and “community spirit” diminished with the introduction of a piped water supply, and the steady out-migration of young people from the community making it easier for persons to degrade the river.

According to Inglis, (1993) [indigenous] societies and groups change and adopt new practices and technologies and several changes are noted in the Maroon community. If a timeline were developed to represent the Maroon perception of how the rivers in their care have changed (Figure 9), it would show that infrastructural and agricultural development were the main markers of the degradation of the river. Other factors may be security and settlement after the 1739 peace treaty, creolisation and assimilation, infrastructural development (roads and piped water supply), and agricultural development and agricultural decline. These events and changes precipitated changes in maroon culture and socio-economic realities that may or may not have impacted the river. For example, the permanent settlement of Moore Town would have introduced sustained inputs of human waste and sediment from small scale agriculture, and the increasing affluence associated with road expansion, paid employment and commercial activities decreased the dependence on local resources. During the youth focus group, a few participants said that the people who pollute the river “know that they can buy fish in town”. It is also worthwhile to point out that several persons said that much of the environmental degradation in Moore Town can be traced back to inter-generational and other conflicts within the Maroon community as described in the results section.

Present realities therefore raise several impediments to effective conservation in Maroon-controlled areas. Their communal land ownership has the promise of community conservation but that communal system is weak; apart from the Maroon council, their community organisation is weak and they face many other important socio-economic issues such as the need for road improvement and services such as garbage disposal. The solution to environmental problems in Moore Town may therefore lie with their reinforcement and restoration of community cohesion and strengthening the maroon identity especially among the young. The link between community and cultural identity and environmental management was captured in the assertion of one Maroon Elder at the Council meeting of July 13th, 2005, “The river is being degraded because [young] people no longer respect Maroon traditions”.

The value of Maroon TEK
The ecological knowledge of freshwater systems exhibited by the Maroons was centred on fishing and gathering of aquatic food species. With the exception of the American eel, none of the 13 species that they recognised are considered endangered or vulnerable. However, most of the
species that they harvest are migratory and use the entire watershed during their life cycle. Migratory aquatic species are increasingly being recognised to be highly sensitive to the downstream and upstream effects of human activities and infrastructure (Abell et al 2007).

Maroon knowledge of aquatic fauna included habitat requirements, some feeding habits, seasonal patterns and movements. For example, several Moore Town residents noted the recent trend in which the annual upstream migration of juvenile gobies has become infrequent and unpredictable. This used to be an event that the community anticipated in October and November when the fish would be easily scooped out of the river with baskets. Some Maroons recognised the importance of sub-habitats such as crevices between rocks as important habitats for fish and shrimp and how fallen fruits and leaf packs attract shrimp (detritovores) and consequently predatory fish.

The concept of ‘indicator species’ is also incorporated into Maroon ecological knowledge -for example the use of “weh-du” to indicate water suitable for drinking. Local scientists, including the author, and park personnel have advocated and used a range of macroinvertebrates which may or may not be relevant to local communities. However, the broad ecological knowledge of aquatic species (such as shrimp) among the Maroons, can form the basis for developing culturally relevant indicators of river quality. Future research into the suitability of these species as indicators is recommended.

As it is with much of Maroon culture, Maroon ecological knowledge related to aquatic ecosystems primarily lies with the elders. It is proposed that the remaining ecological knowledge be bolstered with training and monitoring. The importance of these species to the local communities as well as their utilisation of the entire watershed points to the future use of aquatic migratory species as culturally relevant indicators of watershed condition. It is likely that even though the goby migration is no longer an annual event, the knowledge of that event can be used as the basis for educating the community about the life cycles of other migratory species such as the shrimps and mullets.

Recommendations for conservation with the Maroons

Both TNC and JCDT have long-term goals of establishing effective freshwater conservation in Rio Grande. It is therefore necessary not just to incorporate the Maroons but also to recognise the group’s unique attributes that can facilitate the success of such efforts. These attributes include their land ownership, their location, their ecological knowledge and their river and forest based cultural heritage that is still in the collective memory if not practised. Above all, the Maroons own lands and waters important for conservation. Because of their land-ownership, it is likely that restoring riparian buffers in Maroon areas (given their consent and support is) will be less problematic than in other areas in Rio Grande valley where the ownership is either fragmented into individual lots or under large scale commercial agriculture where setting aside land to create a buffer might be seen to threaten the profit margin. Unfortunately, the group’s ownership structure has degenerated from a communally-managed system into an open access one in which the “tragedy of the commons” (Hardin 1968) is in operation.

Many Maroons were aware and proud of their cultural heritage around the river even though the younger persons have no direct experience of it. An environmental education programme that builds on this “weak” cultural heritage will have the dual effect of helping to revive and preserve this heritage and helping to fill the gap between maroon values and practices. This programme will be a better tool for intergenerational cultural transmission than the oral system which has broken down. There is also the possibility of working with persons who still feel a strong connection to the river such as the young and adult men who fish regularly. These persons will be
ideal for long-term monitoring of river health in order to gauge whether conservation activities are having an effect.
References


Institute of Jamaica website, http://www.nlj.org.jm/docs/history.htm#jamaica


Research Questions

1) What are the direct and indirect uses of rivers and streams (springs and rivers) in the Moore Town? (Can you rank these in terms of importance)
   a. Drinking
   b. Bathing
   c. Laundry
   d. Other household
   e. Swimming and playing
   f. Fishing: fish, crayfish, snails
   g. Baptism/ healing
   h. Irrigation
   i. Gravel and sand for building
   j. Transport

2) Are there zones associated with each use, can these zones and the springs and streams be mapped?

3) a. Are there any problems associated with these rivers and springs, e.g. flooding, river poisoning, garbage, silting, no fish.
   b. Which current activities listed above degrade the river

4) What are the local names of the springs streams and shrimp, fish etc therein?

5) How much of the water is stored?

6) What infrastructure such as pipes and entombments have the community constructed to facilitate use of the springs and streams?

7) How valuable are the springs and streams compared with piped water? And why.

8) How do the Maroons conserve the rivers and springs in their stewardship?

9) Who is responsible for the state of the springs and streams? Is there a governance structure in place?

10) How important is it that the spring and streams are clean enough for drinking bathing etc.?

11) Are there any traditional practices involving these rivers and springs that are no longer practiced?

12) Are there any traditional songs or stories involving these rivers and springs?

13) What would Maroons like to change about the springs and streams and how they are used?

14) How do the Maroons conserve the rivers and springs in their stewardship?

15) Cross Cutting questions

16) Are there any difference between males and females and age groups with respect to the above questions?

17) Is there a difference between knowledge, attitudes and practice?
1. Use, Quality and Storage of Water
   a) What are the springs and streams in the Maroon Settlement used for?
   b) Can you rank these in order of priority and state why?
   c) Are there zones associated with each use?
   d) Can these zones and the springs and the streams be mapped? (use base map)
   e) How important is it that the spring and streams are clean enough for drinking, bathing etc.?
   f) Which of these activities degrade the river? (Water quality, fishing quality)
   g) How much water is stored?
   h) Who carries most of the water and why?

2. Health Issues and environmental awareness
   a) What are the local names of the springs and streams? (Use map)
   b) Are there any problems associated with these rivers and springs?
   c) If so, explain how this affects your household?
   d) Have you experienced any illnesses related to the water?
   e) Are there any healing or medicinal values of the water?
   f) Who is responsible for the state of the springs and streams?
   g) Is there a governance structure in place?
   h) How is the river kept clean and healthy?
   i) Who is located downstream of your streams and along the Rio Grande?
   j) How do your activities affect them?

3. Infrastructure Issues
   a) What infrastructure such as pipes and entombments have the community constructed to facilitate use of the springs and streams?
   b) How are these maintained?

4. Traditions and Practices
   a) What are the local names for the products (fish etc) from the river?
   b) What are the current traditions and practices with regards to the springs and streams?
   c) Which of these practices are unique to maroons, rural Jamaicans, Jamaicans in general?
   d) Are there any traditional practices involving these rivers and springs that are no longer practiced?

5. Feelings and Beliefs
   a) How valuable are the springs and streams compared with piped water? And why?
   b) What would Maroons like to change about the springs and streams and how they are used?
   c) Are there any traditional stories and songs about springs and streams?

Participatory Learning and Action
- Use a Mobility Map to determine approximate location of springs and streams (Question 1c)
- Use the Priority Ranking or Pairwise to determine priority in use of water for males and females (Question 2a)
- Use a Problem Tree to analyze issues (Question 3)
- Use a Timeline to get a historical profile of water use and management in the community (Question 5)
Appendix XXXX

Focus Groups meetings

Attendees:
Women’s Group:
Donnette Hamilton
Carol Cochrane Osbourne
Sylvia Lammie Bell
Ann-Marie Dernard
Yvonne Bernard
Raquel Spence
Norma Burke
Lorna Bernard
Jacqueline Harris
Valine Forsythe
Eunice McQueen
Lisa Smith
Sharwell Minott
Melina Smith
Yvonne Crawford
Rhonie Cuthbert
Jennifer Smith
Dennis Bernard
Charmaine Shackleford
Melrose Minott
Vivienne Ireland
Rosalee Paul
Joan Kildare
Errol Verley