

MSc in Anthropology, Environment and Development Dissertation

**Community Involvement in Mangrove Restoration, Guyana, South
America**

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Abstract

This study considers the implications of the benefit of mangroves to a coastal community in Guyana, South America, from several different angles such as the sea defense and tsunami protection factors as well as considering the country-wide economic benefits of potential climate change mitigation factors. The study focuses on the awareness of the community regarding the mangroves, the ways in which the mangroves are significant to them and motivations for them to become involved in a mangrove restoration project.

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Acronyms and Abbreviations

BAU	Business as Usual
CCS	Carbon Capture and Storage
CDC	Community Development Council
CO ₂	Carbon Dioxide
LECZ	Low Elevation Coastal Zone
MAC	Mangrove Action Committee
NARI	National Agricultural Research Institute
NDC	Neighbourhood Democratic Consult
PO	Participant Observation
RDC	Regional Democratic Council
RED	Reducing Emissions from Deforestation
REDD	Reducing Emissions from Deforestation and Degradation
SLR	Sea Level Rise

Glossary

Bora	Running green bean
Jagon	Current Government
Koker	Structure at sea wall to control water level

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Introduction

Research context

Guyana's mangrove belt is currently being depleted by natural erosion and unsustainable anthropogenic usage; this depletion could have huge impacts on the coastal ecology and the coastal population. A very high proportion (90%) of Guyana's population lives in the coastal zone which is also a key agricultural area for the country (Allan, 2002) making protection of the mangrove forests critical (UNCCD, 2002).

The importance of preserving mangrove forests is increasingly being recognized, including by Guyana's government (UNCCD, 2002). Mangroves help to protect against coastal erosion and flooding of agricultural land behind them by acting as a defense against tides and waves. With current climate change predictions expecting the sea level to rise and wave energy to increase, mangroves are only going to become more important. Guyana also uses man-made sea defenses, however, it has been found that mangroves are the most cost-effective defense. Flooding by the sea is both a short-term and a long-term problem, due to the impact on the salinity of the soil (Allan, 2002), so the importance of effective preventative measures is paramount for this highly agricultural area.

Part of the reason for depletion of the mangrove belt is said to come from unsustainable anthropogenic uses, however, many of these coastal communities rely

on the mangroves for their livelihoods, which also has implications for the national economy. Indirect uses of mangroves in Guyana include both providing a nursery for fisheries and also eco-tourism based on local biodiversity. Direct uses that involve mangrove harvesting include tanning bark, fishing seine poles, producing burnt earth (for road building), fuel wood and crab harvesting. So far, no preferred or satisfactory alternatives have been found to substitute for these uses (Allan, 2002), despite an increasing awareness of the benefits that protecting mangroves can bring. Allan identifies the need for further research into the role of alternatives.

The FAO, in their 2005 draft assessment of global forest resources, argue that Guyana's coastal mangroves were substantially depleted due to human activities during the 1990's (FAO: 5) and despite a global trend suggesting that the rate of mangrove depletion is slowing due to policies protecting against degradation. However, the depletion of mangroves in Guyana is being accredited to smaller scale use of the mangroves rather than larger scale conversion of the land use type, for example, for aquaculture. The FAO argues that whilst Guyana does have some legislation it is not specific to mangroves or consistent enough to be effective.

More recently the mangroves have been declared a protective species by the Minister of Agriculture and the National Agricultural Research Institute (NARI) is currently implementing a restoration project of Guyana's coastal mangroves. The Mangrove Action Committee (MAC) has been set up, hosted by NARI, in order to, amongst other objectives, protect and rehabilitate the mangrove ecosystem along Guyana's coastline. Prior to the commencement of replanting at Mon Repos this study was intended to analyze the awareness of the community towards the role of the

mangroves as part of the sea defense and to consider any impacts the replanting could potentially have on the community at Mon Repos. Community participation has been recognized as a key element of the mangrove management project at Mon Repos in order to provide local communities with an involvement in the project and education as to the importance of coastal mangroves.

Study aims/objectives

This study considers community involvement in the NARI mangrove management project at Mon Repos, East Coast Demerara, which is one of the proposed restoration sites. A range of methods will be used to draw out the ways in which the presence of mangroves impact upon the community and future potential issues that may arise with the planned replanting of the area. The focus of the study revolves around the past and current experiences of mangroves in order to consider the local perspective by looking at the importance of the mangrove to local communities, the reasons behind mangrove use and possible alternatives to using mangroves.

The intention of the study is to provide further understanding of the socio-economic importance of the mangroves and insights into alternatives to using mangroves, especially factors which can encourage the adoption of sustainable alternatives of potential benefit to local communities. During my fieldwork my overall research questions will allow assessment of the possible impact of NARI's mangrove restoration project on the community at Mon Repos and potentially this could also

provide insight into potential implications for mangrove management at other sites in Guyana.

Research questions

- 1) Determine the significance of mangroves for local people at Mon Repos, including both subsistence and commercial use.

- 2) What are the main factors limiting the uptake of alternatives to mangrove use?
 - a. What alternatives exist?
 - b. What are the actual or potential benefits of these alternatives?
 - c. What are the factors that limit uptake of these alternatives?

- 3) What are the main motivations to be involved in the mangrove management project?



Fig. 1: Map of Guyana (source: Office of the President, <http://www.op.gov.gy/mapofguyana/mapofguyana.htm>)

Study context

Guyana: Country Profile

The Cooperative Republic of Guyana is located on the northeastern Atlantic Coast of South America sharing borders with Venezuela, Brazil and Suriname (Fig. 1) although Guyana is the only English speaking country. The population size is approximately 750,000 of which 90 percent permanently reside along the low-lying developed coastlands, making up approximately only 5 percent of the country's total land mass of 215,000km² (Smock, 2008:VII). This low-lying coastland is estimated to be 1.4 meters below sea level (Ellis et al. 2009: 22) so sea defenses are vital to protect against flooding. This coastal area would be considered to be in the Low Elevation Coastal Zone (LECZ) defined as 'the contiguous area along the coast that is less than 10 meters above sea level' (McGranahan et al. 2007:17). Guyana's interior is relatively unpopulated and tropical forests cover 18.6 million hectares (Trevin & Nasi, 2009:1).

Guyana has a long history of colonialism, which goes some way to explaining the mixed influences on the culture, settlement patterns and land use. Archaeological records suggest the Amerindian's were present in the northwest region from around 9,000BC where their hunter-gatherer lifestyle slowly branched into small agricultural communities spreading from the coast into the interior. During the 16th Century there was little interest in Guyana from European explorers until the gold rush in other areas of South America. The first Dutch settlement was small but had good trading

relationships with the Amerindians, although the Amerindian population suffered at being introduced to new diseases. As the Dutch made more settlements and began cultivating the land they created a Dutch government and colonized Guyana. Small plantations required labor and some Amerindian groups were initially put into slavery until African slaves replaced them in the mid 16th Century. The success of the plantations and the establishment of the Dutch West India Company lead to more land being cultivated, an influx of settlers and the export of sugarcane. The French and British both attacked the colonies due to their success but the Dutch remained in control and eventually continued expanding. The third area to be colonized by the Dutch was Demerara where there were fertile lands along the coast. (Smock, 2008:3-5)

The British attacked and took control of the colonies during the American War of Independence and built Fort St George at the mouth of the Demerara river and started to develop a town. The French soon gained control and continued to build the town into the capital city before giving the colonies back to the Dutch. Flooding was frequent in the coast area and so the Dutch built a system of canals. Eventually the colonies became formally British in 1814 and the capital city was named 'Georgetown'. Despite uprisings and revolts the slave trade was still in effect and the British started to put legislation in place towards the abolition of slavery, however, slaves were still being brought in from the Caribbean and the revolts continued. Total freedom wasn't in effect until 1838 but then the emancipated slaves chose to get sustenance from the local land rather than working for a wage on the plantations. Eventually the plantations were forced to start selling off land and the ex-slaves grouped together to buy the land and set up villages where they could live and

cultivate the land on their own terms. Indentured slaves were brought in from Europe and India to try to resolve the labour shortage but eventually the majority of plantations had to close and sell off their land, which was turned into villages and in the 1960's Guyana was granted independence (Smock, 2008:6-13). This brief and simplified version of Guyana's colonial past shows the influences, which have gone into forming Guyana and Guyanese culture as it is today. The fertile soils encouraged settlements on the Demerara coast and systems of drainage channels, kokers and conservancies were created to protect the plantations from flooding and provide irrigation. The plantations were sold off over time and turned into villages found along the coast today. Guyana's official language is English but it's many influences throughout its colonial history means that it is commonly spoken in a Creolese dialect, especially along the coastal areas.

Guyana is governed by parliament, the president and the cabinet who are three branches of democratic power (Smock, 2008:13). However, the country is divided into 10 regions and each region has a Regional Democratic Council (RDC) and then on a local level a Neighborhood Democratic Council (NDC) who maintain the roads, collect the garbage, clean the drains amongst other responsibilities.

Study Site: Mon Repos

Population and Housing Census data

This research focused on the study site of Mon Repos, East Coast Demerara, Region 4 which is located approximately five miles from Georgetown. According to the 2002 Population and Housing Census (Table 1) there is a high proportion of Indo-Guyanese residing in Mon Repos. The majority of livelihoods are in the service workers, shop & market sales workers, skilled agricultural and fishery workers/farmers and craft and related trades workers categories (Table 16). The majority of the residents work, the second highest activity is home duties and then attending school. The majority of the head of household reached secondary level education as the highest form of formal education received (Table 7).

With regards to housing the most common type is undivided private dwelling (table 19) and the vast majority of houses are owned freehold, only a small proportion (2.4%) are considered to be 'squatting' on the land. An interview with the Mon Repos NDC stated that there are now no squatting areas within this particular NDC. The majority of households are built with wood, then a combination of wood and concrete and then concrete alone, other materials are used very rarely (Table 21).

The highest proportions of fuel used to cook with is gas or kerosene (Table 27) and the most common method of disposing of garbage is by burning and then by dumping on land, only 14% were using a garbage collection service in 2002.

Fig.2: Mon Repos Layout (Original by Ronn Sullivan)

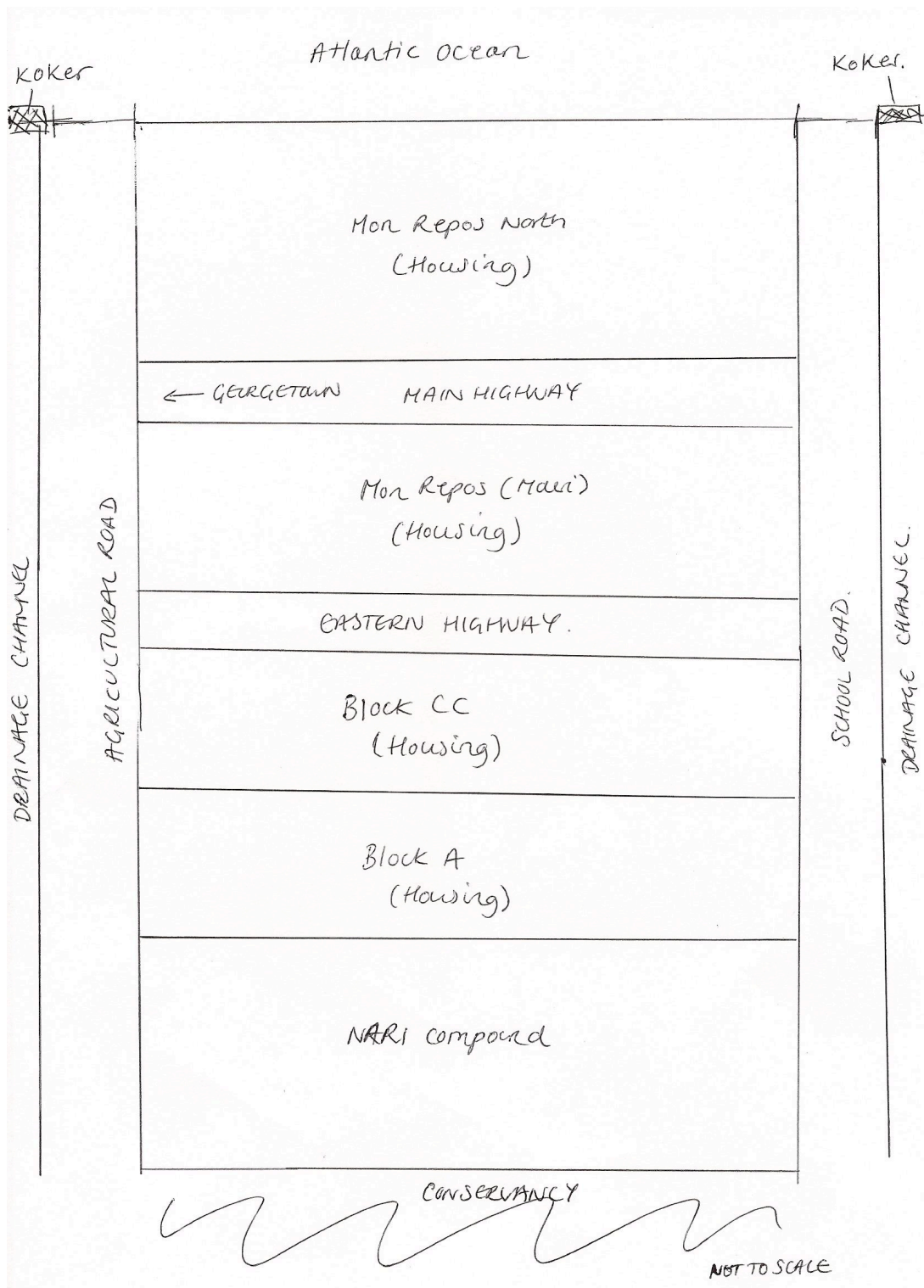
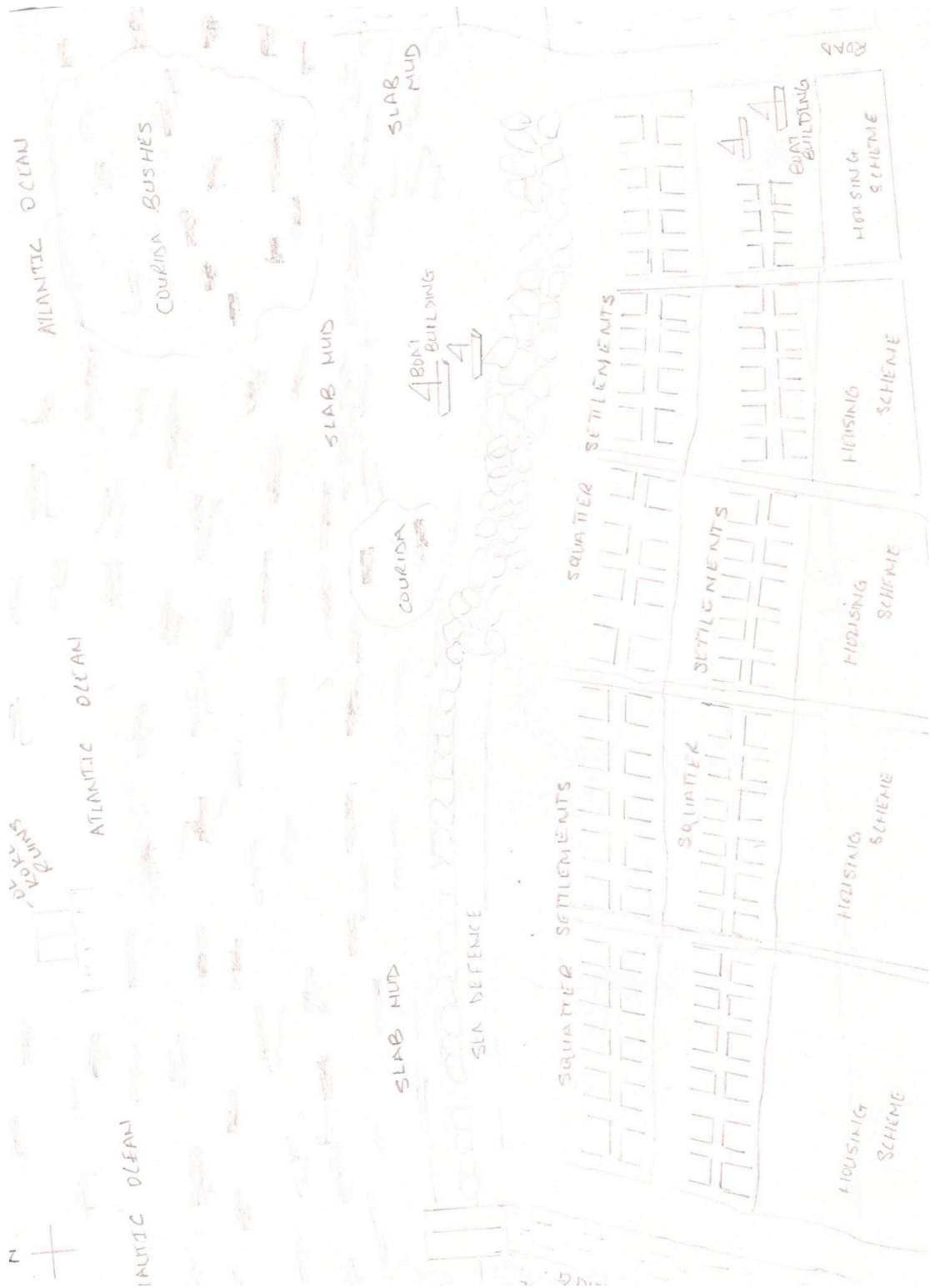


Fig.3. Plan of Mon Repos North (NDC)



Fig. 4. Resource map of mangrove area (Reshmi Persaud)



Mangroves

Mangrove forests are complex ecosystems which are highly adapted to a wet, saline coastal environment and require the accretion of mud banks to grow for which ‘there is a cyclic pattern of erosion and accretion... along the coast ‘(Pelling. 1999:249). For this study the focus will be on the black mangrove otherwise know as the ‘Courida bush’. To avoid confusion the terms mangrove and Courida will be used interchangeably throughout this study, mostly due to language issues arising when interviewing members of the community for which will be explained further on.

Mangroves are important to coastal communities as they can help reduce the risk of flooding in low-lying coastal areas as well as supplying a number of products, which can be sold for livelihood purposes. They also provide a habitat for fish and crab species as well as attracting flora and fauna, which can lead to an increase in ecotourism and economic benefits for the country. Other economic benefits have the potential to be recognized through carbon sequestration. (Ackroyd. 2010: 26).

Mangroves and climate change

The warming of the earth’s atmosphere has been caused by Carbon Dioxide (CO₂) emissions released by burning fossil fuels. In order to reduce the level of these emissions, and therefore the impact on the world, methods of capturing and storing the CO₂ need to be encouraged and rewarded. These methods are known as ‘Carbon Capture and Storage’ (CCS) such as the uptake of CO₂ by forests. It has been argued that a combination approach of enhancing natural processes, retrofitting existing

plants, new power plants with lower emissions and research artificial methods in order to achieve storage for 30,000Km² per year (Chu. 2009:1599). It has also been argued that more focus should be on wetland carbon sequestration rather than focusing on dry land ecosystems, despite the larger areas they tend to cover. Chmura et al. (2003) analysed data for 154 salt marsh and mangrove sites in a range of oceans and at a range of latitudes finding that they store more carbon per unit area than peatlands. Mangroves are therefore very valuable with regards to carbon sequestration and climate change financial mechanisms.

RED (Reducing Emissions from Deforestation), also commonly known as REDD (Reducing Emissions from Deforestation and Degradation), is a financial mechanism designed to mitigate against climate change whereby credits will be traded on international carbon markets to reward countries for reducing deforestation rates. It is anticipated that in line with climate change mitigation the mechanism will also promote biodiversity and conservation goals and poverty alleviation in developing countries. However, it has been argued that countries such as Guyana that already have low rates of deforestation and high forest cover will not be able to be rewarded on such a scheme as the credits will be calculated according to a baseline calculated by a BAU (Business as Usual) scenario (Ebeling and Yasue. 1918). This element of additionality to the mechanism means that it can't reward reductions of deforestation that would have occurred anyway.

The Guyanese government has outlined a Low Carbon Development Scheme by which to create a low carbon climate resilient-economy. They believe that they are eligible for REDD Plus schemes due to their valuation of their forest if it was

harvested for maximum economic value. This would bolster the economy and allow it to follow a low carbon trajectory as well as making financial resources available for upgrading the sea defenses. The long-term benefits of the Low Carbon Strategy would be investment in clean energy, adaptation to climate change through flood defenses and the development of health care and education. Ellis et al. (2009:22-27) analysis of the strategy is that the plan is well suited to development goals as well as being comprehensive with a good level of international support and collaboration, however, it is not yet certain whether Guyana will be eligible to receive payments through REDD mitigation policies and this is the basis for the strategy.

As previously stated a large proportion of Guyana's population and agricultural land is located on the coast within very close proximity to the sea on low-lying land so the rate of sea level rise is very important. The sea level has been rising since 1950 and Cowie (2007: 287) explains that this is caused by a combination of melting ice caps and shelves due to increased global temperatures (global warming) but also that as oceans warm they expand, which is known as 'thermal expansion'. Much of the contemporary SLR (Sea Level Rise) has been caused by this expansion of the ocean rather than from melting ice (Cowie. 1950:282). As much of the world population lives in low-lying coastal lands the human impact of SLR could be enormous with the effects ranging from the immediate such as increased flooding and long-term such as increased erosion and salt water intrusion into groundwater (Nicholls & Cazenave. 2010:1518) with negative socioeconomic impacts. Nicholls and Cazenave go on to argue that the future of SLR is unpredictable and that more research is needed to understand the contemporary causes of SLR and also further research on coastal

management policies, which can also play a role in SLR. This combination of further research will provide insight into adaptation to SLR especially in developing countries with limited capacity.

This study focuses on the short-term impact of SLR of increased flooding of low-lying coastal areas. Not only does the immediate consequence of flooding involve danger to human life, property and longer-term consequences such as increasing the salinity of agricultural land and impacting upon livelihoods and the economy but there are also several health implications following flooding. Cowie (2007:362), amongst others, points out the negative effect of flooding on drinking water supply and sanitation systems potentially leaving flood victims with unclean water, which can obviously have very serious health consequences. In tropical countries, such as Guyana, flooding can also provide breeding grounds for insects such as mosquito's, increasing the risk of diseases such as Dengue Fever. Cowie (2007:363) gives the example of the Bangladesh flood in 2004, which displaced 1 million people, sewage escaped, mosquito's increased and food supplies were limited which all conspired to increase disease, for example, there were over 270,000 reported cases of diarrhoea). This highlights the seriousness of the potential consequences of flooding.

McGranahan et al. (2007) argue that to reduce the disaster risk that comes from having a high population density in low-lying coastal zones a combination of adapting settlements, mitigating climate change and migration needs to be uptaken. Although mitigating against climate change can go along way to reduce the risks to some extent it is already too late. Sea levels are already rising and extreme climate events increasing so adaptation to living in coastal areas such as these is vital and migration,

although with its social, economical and logistical drawbacks, needs to be considered. Migration would also help to relieve pressure on coastal resources in some instances. As Guyana's interior is significantly under populated in comparison to its coast migration inland could be considered an option, however, this would be disruptive to communities and livelihoods not to mention the need for infrastructure development in any potential relocation areas.

This shows how important mangroves are to Guyana, not only in terms of supporting the sea defense (adapting to climate change) but also in mitigating against climate change and potentially assisting in securing income for Guyana from climate change mitigation financial mechanisms. Another reason why the presence of mangroves along the coastline is so important for the population that resides there is the potential benefits of mangroves in the case of extreme climatic events: tsunami.

Morgan et al. (2005) review both the short and long term health implications of flooding disasters, such as the 2004 South Asian tsunami, and considers the short-term health consequences associated with flooding but also the long-term impacts such as mental health issues associated with stress and health effects of lost livelihoods following flooding caused by an extreme climate event such as a tsunami. They argue that the long-term reduction in income caused by lost livelihoods due to flooding can actually increase child mortality to more than the total mortality attributable to the actual flooding.

Following the 2004 tsunami a study of 18 coastal hamlets in India (Kathiresan and Rajendran. 2005) found that mangroves were beneficial in protecting against human

mortality and loss of wealth. However, the cost to human life and inhabitations was also decreased with the distance from the shoreline and the height of the land relative to sea level and recommend that dwellings should be at least 1km from the sea. Danielsen et al. (2005) also considered the impact of the 2004 Indian Ocean tsunami on Cuddalore District in Tamil Nadu, India. They found that areas behind mangroves were significantly less damaged by the tsunami waves and also that villages without mangroves were completely destroyed in contrast to villages behind mangroves that were not harmed. However, it has to be noted that where a tsunami hits with full intensity there is little that will protect against the inevitable destruction but that the presence of mangroves, and other vegetation, can reduce the force of the waves caused by such an event.

Community involvement in mangrove projects

Walters (2004) considers two case studies from the Philippines (Bais Bay and Banacon Island), which are often cited as examples of successful community management for the reforestation of mangroves and argues that such management systems need to be carefully evaluated before it can be argued that they are successful for conservation.

Narratives are moving towards viewing local people as caregivers' of forest resources rather than destroyers and in many cases where people have managed resources without government oversight or intervention. However, objectives of local resource managers cannot be assumed to be inline with development and conservation

objectives and Walters argues that to see what objectives are being met you need to consider the management systems over the long term.

Walters found that the reasons for degradation of mangroves was for firewood, posts in fish weirs and construction wood as well as being cleared to make space for other uses for example aquaculture and residential housing. Mangrove cutting has been slowed due to government protection and the issuance of leases. Local planting was done to provide an alternative source to the protected natural mangroves and in later years to protect homes against wave and wind damage (Walters. 2004: 183).

The motivations to plant that Walters discovered stemmed from storm protection, bunsod construction to enhance the security of their tenure of a particular site as there was competition for intertidal space. In many cases the locally planted mangroves were later cut down (by the planter) to convert the land use.

It has been perceived that the planting in these cases has been environmentally beneficial and Walters argues that although they are examples where local people can manage resources without the presence of external agencies but that the management decisions were based on economic factors rather than environmental conservation objectives (Walters. 2004:189). Walters suggests that the relationships between local people and resources are complex and not predictable and there is still a role for the state in facilitating local management.

Katon et al. consider the case of Cogtong Bay, Philippines, as a shared responsibility strategy for resource management between the government and resource users.

Although often local resource users can understand and act on their own to solve problems the support of government and agencies to add legitimacy through co management and shared responsibility. The level of co management is site specific and there are power balances and relationships that are constantly evolving but ideally reduce conflict by allowing resource users to be involved in developing and enforcing the rules.

Following the recent protection of mangroves in Guyana this study considers the significance of the mangroves to a Guyanese community and the potential impact of NARI's mangrove management project. NARI proposes to restore mangroves along the coast through replanting and then monitoring and protecting. It is a key aim of the project that the communities at the project sites will be involved in all aspects of the project as that will be part of the key to its long term success. Part of the project is educating people to the benefits that mangroves can bring them and how to avoid destructive practices

Leach and Fairhead (2002) consider the discourse of global environmentalism and argue that although economic and political relations often justify control over resources for 'economic-development agendas' (Leach & Fairhead, 2002:221) that this can negatively impact upon local livelihoods by denying them access to resources they previously relied on. This can lead to a continued use of the resource, which without alternatives is vital to both food and income security, despite possible legal consequences such as fines and taxes. My study intends to consider a community's awareness of the presence and benefits of the mangroves and to look at the ways in which the mangroves are currently significant for this community, any impact the

protection of the mangroves and the proposed restoration project may have on livelihoods within the community.

Methodology

Exploratory methods of research- Preliminary research

Preliminary research involved selecting the study site and conducting key informant, or 'expert', interviews with local mangrove and community experts. The expert interviews were designed as semi-structured interview guides in order to glean the key areas and issues to be focused on in the community interviews. The fieldwork timeline was 6 weeks so it was important to narrow down the key issues that need to be considered as quickly as possible.

A walk of Mon Repos Walk of Mon Repos North and the shoreline was conducted to learn the layout of area and begin to observe issues with the mangroves such as the presence of boats, cattle grazing and garbage. This allowed assessment and understanding of the current state of the mangrove stand, the sea defense, and to see first hand the proximity of the households to the sea. A sketch of the area was also created by a local resident to show the sea defense and the resources in the area (fig.4)

On arrival at Mon Repos there was some consideration as to a possible change of field site further down the coast. This was due to a change in the understanding from the pre-field period to the fieldwork period based on several incorrect expectations. Mon Repos was a much larger village than anticipated with only a limited stand of

mangrove. However, for various logistical reasons it was not possible to change study site so it was decided to continue the research at Mon Repos but to focus the study on the area nearer the shore known as Mon Repos North. Although this wouldn't be a representative sample for the whole of Mon Repos the study area would be at the site where the mangrove users are concentrated.

Following the key informant interviews the group and individual semi-structured interviews were drafted and the individual interview was piloted with 5 residents of Mon Repos north. One of the main insights of the pilot revealed the need to use local language for mangroves and to refer to them as 'Courida bush'.

Methods of research

The sample size of 30 for the individual interviews was calculated based on an estimate of 500 households at Mon Repos North. Sampling strategy was randomized sampling and achieved by systematically walking the rows of the village and approaching every 10th house. The aim of the in-depth semi-structured individual interviews was to gain further insight into mangrove uses within the community, alternatives to using mangroves and factors affecting the uptake of alternatives. The interviews also considered the motivations that either encourage or prevent people from being involved in the mangrove management project, for example, Walters (2004) research into planting motivations in the Philippines. These questions gave insights into the potential benefits and limitations of community involvement in the mangrove management project and should indicate ways in which alternatives to

mangrove use could be more successful in the future. The interview guide was designed to have a combination of closed and open-ended questions in order to have results that could be comparable but that also gave the participants to talk more freely about the topic.

Group interviews were carried out with key mangrove user groups as determined by the key informant interviews. Two group interviews (fishers and women) were completed, which provided a different environment from the individual interviews in order to facilitate discussion. The group interviews were designed to create a list of local mangrove uses and rank these uses in order of importance to local significance, as well as facilitating discussion between the interviewees with regards to current mangrove uses and issues and the proposed mangrove management project.

Following the individual interviews an issue came up regarding the dumping of garbage where it was suggested that it could be a problem with an irregular garbage collection service from Mon Repos market. To further consider this theory a questionnaire was carried out with 20 market vendors working at Mon Repos market to find out more about the garbage disposal system there.

During the fieldwork period there was opportunity for attendance at Mangrove Action Committee meetings, attendance at Mon Repos and Hope Beach community meetings (where NARI presented to the community the proposed replanting project for the two pilot sites), and an interview with the NDC.

Limitations of methods

The time that was available and the size of the community at Mon Repos meant that the study was confined to Mon Repos North only in order to focus on the main mangrove and shoreline users and therefore my results cannot be said to be representative of Mon Repos as a whole. The time that was available also reduced the amount of rapport that could be built within the community and so made it difficult to make arrangements to meet with people, in particular for the group interviews, which resulted in a reordering of intended research methods. Initially it was intended to use the group interviews to help refine the individual interview questions but it was just not possible to arrange the group interviews in this order. However, the expert interviews, resource walk of the area, pilot interviews and discussions with research assistants allowed further understanding before finalizing the questions. With a short fieldwork timeframe only a limited amount of participant observation could be achieved but by also observing MAC meetings, presentations & community meetings it was possible to build up knowledge of the overall picture and structure of the restoration project and to bring to light any issues not previously aware of.

Analysis & results

The following results are from in-depth, semi-structured interviews carried out with residents of Mon Repos unless otherwise stated.

Individual interviews general information:

33 people interviewed, one per household, 14 female, 19 male

Mean time living in Mon Repos: 28.5 years

Mean adults per household: 3

Mean children per household: 2

Mean year of birth: 1961

Results by research question

1) Determine the significance of mangroves for local people at Mon Repos, including both subsistence and commercial use.

Firstly respondents were asked if they were aware of the Courida bush at the shoreline as this was an important starting point of the interview but also if individuals are unaware then it would suggest that the mangroves are unimportant to them. All interviewees were aware of the presence of the Courida bush at the shoreline apart from one but he had only been living in Mon Repos for the last 6 months.

The interviewees were asked if they considered the presence of the Courida bush to be good, or bad, or both for them. 32 of the 33 interviewees answered that it was good (or both) for them and 20 of which stated that the reason for it being good was for prevention of overtopping of the sea defense. The negative aspects of the presence of the mangroves included providing thieves shelter to hide in order to rob fishermen, preventing people from praying at the shoreline and an increase in mosquito's.

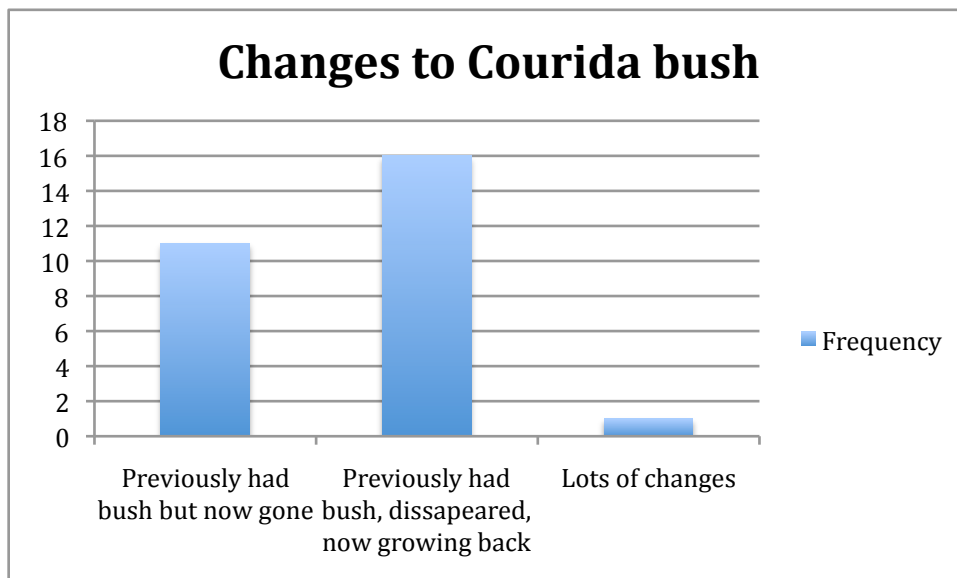
In order to assess the significance of mangroves to local people at Mon Repos they were asked if they use mangroves or the shoreline area for anything and also if they are aware of any uses by other people (Questions 8-9). The reason for including the question of uses by other people (Q9) was to make sure to include all potential uses within the community but also if the individual was aware of the recent legislation being introduced protecting the mangroves they may not want to admit to using it personally. However, it has to be considered that they also may not want to implicate others in the community of breaking the law and this has to be considered in drawing conclusions from the results of this question.

Fourteen (42%) of the interviewees said they were aware of a number of uses that the bush or shoreline could be used for (Q9). Uses for the wood that were stated included firewood (for cooking), seine poles (for shrimp and fish seine nets), and kitchen garden poles (to support vegetables such as Bora). However, it was often mentioned that these uses were in the past and that people weren't currently using the wood. One interviewee answered 'nat now bit lang ago people use to use it for fire side' meaning that in the past people used it to for firewood to cook with. Uses for the

shoreline area included boat building, religious purposes (such as praying at the sea wall), liming (recreational use), pulling fishing boats in, grazing livestock and dumping garbage. It was frequently mentioned that if people are seen cutting the bush they will be reported, showing a strong awareness of the legislation but also to some extent a current desire for people to use the wood. Interviewees seemed to associate this with poverty.

Over 90% of interviewees were aware of changes to the mangrove or shoreline since they had lived in Mon Repos (Q6). However, a few of the residents had only lived in Mon Repos for a few years so some of the changes have occurred relatively recently. The interviewees were asked to describe the changes that they had noticed and these responses were then put into categories as seen in Fig.5.

Fig.5. Changes noticed to Courida bush during time lived in Mon Repos.



Changes that were noticed followed the pattern that the mangroves were plentiful in the past and that they had disappeared, for example, one interviewee responded ‘nat

there na but before time there wa plenty' some respondents followed this up by saying that it was now growing back. The time scale often mentioned was 20/30 years ago the bush was plentiful but then it disappeared and around 3 years ago it started to grow back and this seems to fit with the coastal erosion and accretion pattern. Interviewees were also asked what they thought might have caused these changes and any impact the changes had on them. The majority of causes mentioned were that the bush was broken by the waves and that they were cut down. The majority of respondents that said the changes impacted them talked about flooding although one person mentioned an increase in mosquito's and sandfly as the Courida bush provides a breeding ground.

The interview was designed not to mention the recent legislation protecting the mangroves in case drawing this to the respondents attention affected their response. However, it was asked if they personally thought the mangroves should be protected and all but 2 of the 33 respondents agreed. One of the 2 respondents that said no was the same participant who said the bush was a bad thing and didn't believe that mangroves could withstand the wave pressure and would wash away rather than protect residents from high tides.

2) What are the main factors limiting the uptake of alternatives to mangrove use?

a. What alternatives exist?

Interviewees were asked to consider what alternatives, to using Courida bush or the shoreline area, are available for a set list of 6 uses and actions (Q10.e-f). Table 1

shows the number of participants that were aware of at least one alternative for each use/action.

Table 1- alternatives to using the mangroves

Use/Action	Aware of alternative
10.a Seine poles	17
10.b Kitchen Garden poles	18
10.c Grazing animals	13
10.d Pulling fishing boats in	16
10.e Dumping garbage	30
10.f Collecting Firewood	13

b. What are the actual or potential benefits of these alternatives?

For seine poles and kitchen garden poles the majority of alternatives suggested were to use non-mangrove wood found in the area or to buy wood for example from the sawmill. In this case it would be preferable to use the mangroves rather than purchasing wood, which is more expensive and less convenient. However, several participants stated that alternatives were not needed as people were not using the mangroves for this purpose.

For grazing animals at the shoreline 39% said that there was an alternative. Many respondents mentioned there was a pasture towards the back of the village, however,

for residents of Mon Repos North this is further away and several people stated that it was degraded. Several respondents said that grazing animals would not harm the mangroves as they would not like the salt or the mud, however, animals have been observed eating the mangroves, especially the seedlings that would be detrimental to the restoration project unless a suitable alternative is found.

With regards to pulling fishing boats in many interviewees said that they can use the koker and the channel, however, this is dependant on the tide and also on the amount of boats available. Boat building in the area is also a contributing factor to this as the boats need to be launched into the sea across the mud, and some boat building takes place on the shoreline. The boat builder that was interviewed said that there was no alternative due to the size and weight of the boats.

Dumping of garbage on the shoreline was a big issue for many respondents who were very displeased with the practice. The NDC provides a weekly service to collect resident's garbage so there seems to be no need for it to be dumped at the seashore. There is also a nearby dumpsite where residents can dispose of their garbage.

The majority of interviewees explained that collecting firewood and cooking by the fireside is no longer a common practice and that most people now cook in their homes on a gas or kerosene stove as it is much more convenient, although more expensive. The 2002 census data for Mon Repos also confirmed that the majority of residents were cooking inside. For those that do wish to cook by the fireside, sometimes for religious purposes, there is other wood in the area that can be collected or purchased.

c. What are the factors that limit uptake of these alternatives?

In terms of wood for seine poles, kitchen gardens and firewood it seems that the majority of residents don't use the mangroves for this purpose so alternatives are perhaps unnecessary. Inconvenience and expense would seem to be the limiting factors in this case.

For boats and grazing animals the factors that are limiting uptake of alternatives seem to be a lack of convenient and reliable alternatives at present. Also the understanding of the impact of the use on the mangroves, for example, many participants did not think that grazing animals would damage the bush.

With regards to the dumping of garbage many residents said the NDC service was reliable and worked well for them so they saw no reason for people to be dumping garbage. It was suggested by several people that perhaps the garbage was being dumped by market vendors who wanted to get rid of animal skins, for example, more regularly than the weekly NDC service.

A brief questionnaire was used to follow this issue up with 20 market vendors to find out garbage disposal practices. Nearly all of the vendors interviewed said that the garbage is collected and about 50% said that it was at the end of every day. However, many of the vendors only work at weekends so they did not know about days they did not work. The cost of the garbage service was included in the fee they pay to have a stall. Approximately 75% agreed that the service was reliable, however it has to be considered that the questionnaire was being carried out within the RDC's market

about the RDC's garbage collection service so some participants may have felt under pressure about criticising the RDC. Nearly all of the nearly all of the interviewees appeared to have experienced failure by the RDC and disposed of their garbage in a number of different ways. This was mainly by leaving it in different places - in front of their stall, outside the market, in the drains, or at the side of the street where the garbage service would collect it later. Only one interviewee said that they disposed their garbage at the shoreline so as not to make the market dirty or smelly.

Again the views on dumping garbage on the shoreline were almost universally condemned by the interviewees. They blamed the practice, *by others*, of dumping on the shoreline, on ignorance, poor education and laziness. One interviewee referred to the cost of collection, whilst another said that if one did not take the rubbish away by car that there was no other alternative but to dump it on the shoreline.

3) What are the main motivations to be involved in the mangrove management project?

Interviewees were asked if they thought that the Courida bush could help prevent overtopping from the sea. A belief or awareness of the mangroves as part of the sea defense, with the potential to protect them against flooding, will be a motivating factor. Only one respondent said no and one said maybe, both stating that if the waves come with enough force the bushes will be uprooted. Neither of these respondents wanted to be involved with NARI's replanting project, although these numbers are too small to make any real conclusions from this.

As most participants associated the Courida bush with protection from flooding their experience of flooding and fear of flooding should be a motivating factor for them to become involved with NARI's project. Most residents had experienced flooding since they have lived in Mon Repos, some as many as 7 times. The mean number of floods is 2.2, however, this study did not attempt to quantify the level of flooding that might have been experienced from overtopping. The flooding that participants noted could have been minor with little to no damage or sever flooding. One respondent told of chest height water lasting 6 weeks and having to get a boat out of the house, another respondent told of having to build a bridge between households. The variance of flooding experienced by residents from the same area could be explained by the location of the household in relation to the site of overtopping along the sea defense and also the contours of the land.

Q12: have you experienced flooding from overtopping?

29 of the 33 interviewees (87%) had experienced flooding from overtopping.

<i>Number of floods</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
<i>Number of participants</i>	4	7	6	3	5	1	1	2

With regards to the fear of flooding most of the 29 people who had experienced flooding from overtopping said they worried about flooding concerned (80%). The

remaining 20% did not worry. However, 2 of these had been flooded once, but the other 4 couldn't say. This could mean that they had only experienced very minor flooding, because all but one of the 22 interviewees that were worried could say with certainty how many times they had been flooded. Other reasons given for not worrying about flooding were religious or that there was nothing people could do.

Many of the respondents said that there is no action they can take to protect themselves from overtopping so if they feel they can be part of something to help protect themselves and their households that could motivate them to become involved. Preventative actions that had been taken by some were to keep the drains and yards clean so that the water can run off. Two residents even made alterations to their house, one built a small concrete wall around the front door and another raised the floor when constructing the house.

Awareness of the NARI mangrove management project will obviously be crucial to people from Mon Repos becoming involved, If people are aware of the project and know what it is about and how they can be involved it is a key issue regarding the involvement of the community to the project. Two thirds of interviewees asked had not heard of the project. Of the 11 who were aware of the project, 6 had learnt from TV, and one each from Radio, Newspaper and word of mouth, and 2 had seen some NARI planting activity, although this is based on a presumption. About 50% of those who were aware said that they would like to be involved. However, these numbers are small so it is difficult to form firm conclusions from this data and it has to be considered whether or not they would follow through with becoming involved as for various reasons they may not.

A few people mentioned that they had seen planting in the past although they weren't sure who was responsible for this. Some felt that the regeneration of the mangroves in the area was down to previous replanting whereas others said they thought it was natural regeneration. There could have been a previous sea defense project, university of Guyana students conducting research amongst others although nobody seemed very sure of who was involved. It may be that natural regeneration had occurred with the accumulation of the mud and people have assumed that a previous project has occurred, although previous projects seem to be regarded as unsuccessful, this could be that the mangrove stand is smaller than it was in the past.

All of the respondents that felt NARI could encourage residents to become involved in the project said that they required further information in the form of a meeting, posters or house-to-house visits. Several of the residents that declined to become involved with the project were elderly or did not have good health so physical well being could also be a factor to consider.

Discussion/conclusion

Discussion of research questions following results

- 1) Determine the significance of mangroves for local people at Mon Repos, including both subsistence and commercial use.

The majority of interviewees were aware of the Courida bush at the shoreline and considered the presence of the bush positively as there was strong awareness of the sea defense properties. However, some negative aspects were mentioned, such as an increase in mosquito's, but mostly people said that it was worth putting up with the negatives as the benefits of protecting themselves from flooding outweighed them. Although uses of the Courida bush were mentioned it did not seem to be a concern to people that they were no longer able to use it. This could partly be related to the changes people had witnessed at the shoreline with the disappearance of mangroves so they released the benefits of it whilst it was gone but at the same time it wasn't available to be used so alternatives had to come first.

It was expected to find many people who wanted, or felt they needed, to use the mangroves for subsistence in their daily lives and for their livelihoods but it was rare if people commented that they used it currently and many alternatives were suggested. The significance of mangroves for local people at Mon Repos North was the additional protection the vegetation could add to the sea defense to help

protect them against the economical, physical, mental and health related dangers of being flooded or potentially having to eventually relocate their homes.

2) What are the main factors limiting the uptake of alternatives to mangrove use?

- d. What alternatives exist?
- e. What are the actual or potential benefits of these alternatives?
- f. What are the factors that limit uptake of these alternatives?

It was found that alternatives existed for all the potential uses of the mangrove wood even though sometimes they were less convenient and more expensive. In some case such as the use of firewood the lifestyle has changed now from cooking at the fireside to cooking at a stove inside as it is more convenient now that more women are working.

With regards to the use of the shoreline for grazing animals it seems this is an issue with a current lack of suitable alternative but the NDC is currently working on arranging a pasture that can be cut specifically to feed the animals without them being let loose.

There potentially are alternatives for places to bring the boats in but there were contradicting viewpoints for this. Some respondents mentioned the koker and channel but others, such as the group interview with the fishermen, said this would only be possible at certain tide heights. Depending on the exact location of the replanting this could be an area that needs further consideration.

Inconvenience and expense can be a factor preventing uptake of some of the wood alternatives. The grazing animals issue at the shoreline seems to be a combination of a lack of understanding of the damage that animals will do to the seedlings and also current lack of a viable alternative.

- 2) What are the main motivations to be involved in the mangrove management project?

Motivation to become involved in the replanting project seems to stem from awareness of the sea defense aspect of the Courida bush, past experience of flooding and fear of future flooding. Experience of flooding and worry about the threat of flooding will impact on peoples motivation to become involved in replanting and long term desire for the success of the restoration. Although it was found that although there is often understanding of the benefits of the mangroves in protecting against flooding and a positive interest in the restoration project often people are very busy with work and running the household and would not have time to become involved. It is likely that awareness of the project for people that do not have the time or motivation to be involved will still benefit the long-term sustainability of the plant by educating people against destructive uses so that they will avoid them and also potentially prevent others from harming the mangroves in the future.

Limitations/constraints- critical evaluation of methodology

With regards to motivations to become involved with the project it is easy for people to say they would help but when it comes down to it, for many reasons, they may not be able to. Further research following the replanting would be interesting to see how involved the community was and also with monitoring and protecting the seedlings and future mangrove stand.

Working in a foreign environment for a short period of time makes working effectively difficult when there is unfamiliarity of customs and practices. Also, conducting interviews in a tropical climate means that due to the higher temperatures it is only possible to find interview participants at certain times and working in a climate you are not used to can result in illness in the field such as heatstroke. Attendance at a key community meeting was not possible due to illness, which is frustrating as when the fieldwork period is short there are only limited opportunities available.

It was initially intended to use the group interviews to conduct wealth ranking in order to be able to stratify the results according to wealth categories. It was advised not to discuss wealth directly with people and not all of the interviews were conducted within the home making it difficult to access wealth at all. Although a 'rough and ready' estimation could have been made it would not have been especially reliable and so any conclusions would be negligible.

The language barrier of the Creolese dialect made interviews impossible without the support of research assistants, unless the fieldwork period is longer to allow accustomisation. The use of a voice recorder aided the analysis of the interviews, after creating transcripts, especially for the open ended questions and the interviewees generally responded well to being recorded. Because of the short time in the field the same research assistant(s) wasn't always available so a combination of several people was used. Without the research assistants the interviews would not have been possible but it has to be noted that this could have implications for the standardization of the way the questions were asked and therefore the potential implications on the results.

Although group interviews were not possible prior to the individual interviews, when they did take place they did not facilitate discussion as expected and the individual interviews actually were much more open and informative.

Participant observation (PO) was not an ideal method given the length of the fieldwork but this was made more difficult by not living in the community so not being directly involved in daily life, apart from when conducting interviews, however by visiting participants in their household some level of PO is possible for example observing people cleaning drains and cooking on the fireside. Being more involved with the community would also have helped with building rapport although the community at Mon Repos North was always very welcoming.

Problems with interpretation of data

Because of the protection of the mangroves and therefore the legal implications of the topic it is possible that questions were not always answered honestly.

The style of the interview questions was designed not to be too leading but the open questions made it difficult to compare the results statistically and combined with the language/dialect barrier made it difficult to ask the questions in a uniform way to get the participant to understand what was wanted from the questions without making inferences as to what the answer should be. Often people would comment that they were not aware of people using the bush for anything but when discussing alternatives they would sometimes then recall the potential uses when discussing alternatives so it may have been beneficial to present a list of uses with the question.

Discussion of ethical issues/implications/considerations

Recent protection of the mangroves species by the Minister of Agriculture meant that some of the questions in the individual community interviews could imply wrongdoing by interviewees who answered that they used the mangroves. Prior to conducting each interview respondents were advised that the interview was completely confidential and that there would be no repercussions from answering. It was also not asked if they were aware of the legislation so they would not then be admitting to doing something they were aware of the legal implications. The topic of flooding could be distressful to talk about for those who have had experiences so non-

evasive questions such as ‘how many times have you been flooded’ were used rather than asking them to talk in detail about those experiences. However, the questions allowed opportunity for the interviewees to go into detail if they wanted to and felt comfortable doing so. It was important not to give respondents false hope that the project would mean any impact for them and that any of the interviewers could do anything to help them.

The majority of interviews were recorded with the permission of the respondent and if anybody was uncomfortable with this the interview would go ahead without the voice recorder. One respondent didn’t want to continue the interview and wanted to take the notes with him, it was explained at the outset that he could stop and anytime and didn’t have to answer anything he was uncomfortable with. He was given the notes to take with him and no record of the interview was left with the interviewer or included in the study.

Conclusion

The importance of mangroves has been recognized at an international level due to its protection against flooding as part of the sea defense in low-lying coast regions. It has also been shown to be effect in situations where the waves have increased energy due to tsunamis. The climate change benefits of carbon sequestration are not only environmentally beneficial but also potentially financially beneficial. Mangroves also have many anthropogenic uses, many of which can be destructive to mangrove plants if not used in a sustainable way.

At Mon Repos North there is strong awareness of the protection of the mangrove, and agreement that it should be protected, and also a strong awareness of the mangrove acting as sea defense. So far the presence of the mangrove is recognized as a positive for the local community for its protection from overtopping, however, the negative points that have been mentioned are that it provides a nesting ground for mosquito's and sandfly (where this has been mentioned it is mostly said that the sea defense is more important). There doesn't seem to be much awareness of other benefits of mangroves other than sea defense.

The majority of respondents said that they are not currently using the mangroves for anything although the main use in the past was for firewood. In terms of potential uses that were mentioned during the expert interviews there mostly seem to be alternatives available e.g. for fishing seine poles and kitchen garden poles you can get striping's from the sawmill. For firewood people are using gas or kerosene and cooking within the home rather than at the fireside.

The livestock questionnaire that was conducted showed that it was not the majority of households that had livestock and those households that did generally only had a small number but that they were grazing around the streets and shoreline. Most people questioned said that a pasture would be beneficial. There does not seem to be awareness that grazing animals could be destructive to the mangroves and the same with pulling boats in.

With regards to dumping garbage on the shoreline there does not seem to be awareness that this would be harmful to the mangroves as such but it is recognized as

a big problem for the community. Many of the residents told me that there is actually a weekly NDC garbage service so they do not know why people are dumping rubbish there although it was suggested that the garbage could be coming from market vendors, in order to quickly get rid of animal parts on a more regular basis than the weekly service. Following a brief questionnaire within the Mon Repos market I was told by many sources that there is also a daily garbage service for the market, which is included as part of the vendor's rent to the NDC, which is fairly reliable.

Awareness of NARI's mangrove management project is very limited but generally it is seen as a very positive thing as they recognize it has the potential to help protect them from the sea. From my interview discussion a lot of people are concerned by the threat of flooding, although they often said that there is nothing that they can personally do to protect themselves. People seem interested in the NARI project and mostly would like to be involved, although some later go on to say they are very busy. With regards to motivations to be involved mostly people want more information about the project available within the area, such as a meeting, posters and just general outreach.

Future research needed

Following the replanting it would be interesting to follow up with the level of involvement that the community had and any impacts on their lives resulting from the project. As project prior to commencement of replanting a lot of attitudes in results.

Alternative ways of bringing boats in, rather than dragging through the mud, was an issue that was not resolved here as conflicting views were given so further research may be needed if the boats are impinging on the restoration project.

The issue of garbage at the sea shore did not get resolved, there seemed to be plenty of convenient and free garbage collection services so if this practice continues it would require further research to find the cause of the garbage, if that is possible.

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Appendices

Interview guides

Expert Interview Prompts

My name is Katherine Robinson and I am a student at University College London (UCL) completing a MSc in Anthropology, Environment and Development. I am currently completing research for my MSc dissertation on ‘Community Involvement in Mangrove Management’.

I would like to interview you for your opinions on the mangroves at Mon Repos for use in my dissertation. If there are any questions you would prefer not to answer please don't hesitate to let me know and you may stop the interview at any point. I am using a voice recorder to make sure I don't miss anything that I don't get written down.

1. What are the main benefits of the presence of mangroves?
2. In what ways does the community at Mon Repos use the mangroves and shore line?
3. Which of these uses/actions do you consider destructive to the Mangroves?

4. Are there specific groups within the community that use the mangroves & shore line more than others? Especially those uses/actions that are considered destructive to the mangroves?
5. Are there currently alternatives to these uses/actions? Or alternatives proposed?
6. What do you consider to be the pros and cons of each of these alternatives? For the mangroves & people?
7. Do you think local people still use the mangroves or the shoreline rather than each of these alternatives? If so are there specific factors that are limiting the uptake of these alternatives?
8. Could you estimate the proportion of households at Mon Repos who are reliant on Mangroves or the shoreline for their livelihoods?
9. Are there many people who come from outside Mon Repos that use/harm the mangroves that you are aware of?
10. In your opinion have you noticed a change in the rate of destruction to the mangroves at Mon Repos?
11. Can you tell me about the Mangrove Management Project at Mon Repos?
 - a. What is proposed?

- b. What stage is the project at?
- c. What is your role in the project?
- d. How can the community be involved in the project?
- e. What has been the reaction from the community?
- f. Are there any past interventions in Mon Repos that you are aware of?

12. What would you consider the main motivations for people at Mon Repos to become involved in the mangrove management project?

13. Have you noticed any change/impact in usage since the mangroves were declared protected?

Is there anything else you would like to add or to ask me?

Thank you

Group Interview Prompts

My name is Katherine Robinson and I am a student at University College London (UCL) completing a MSc in Anthropology, Environment and Development. I am currently completing research for my MSc dissertation on ‘Community Involvement in Mangrove Management’.

I would like to ask you for your opinions and experiences on the mangroves and shoreline at Mon Repos for use in my dissertation. If there are any questions you would prefer not to answer please don’t hesitate to let me know and you may stop the interview at any point. I will keep all names confidential. I am using a voice recorder and taking photographs to make sure I don’t miss any of your comments.

Please feel free to share your point of view even if it differs from what others have said.

Diagram of seating arrangement

Topics for discussion:

Are you aware of the Courida bush at the shoreline?

Is the Courida bush a good/ bad (or both) thing to you?

Have you noticed any changes to the Courida bush or the shoreline while you have lived in Mon Repos? Have these changes had any impact on you?

Do you use the Courida bush for anything?

What do people use the Courida bush for? (cards)

What do people use the shoreline here for? (cards)

Rank uses

What about:

- cutting for seine and kitchen garden poles?
- Grazing animals e.g. goats
- Pulling boats in
- Dumping garbage
- Firewood

Do any of these uses damage the Courida bush?

Have you heard about NARI's project to replant the Courida bush on the coast?

Would you want to be involved?

What could NARI do to get you involved in the project?

Possible (to get general categories)

- What do you see as having a good life?
- What are the markers of hardship/poverty?

Anything you want to tell me about the Courida bush?

Semi-structured in-depth Interview Guide (individual)

Date:	Interviewer(s):	Interview no:	
No.	Question	Answers	Yes No F/M Maybe No Ans.
1	How long have you lived in Mon Repos?	<input style="width: 100px;" type="text"/>	<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
2	Can you tell me about the people who live in your household? (ages, gender, what do for a living)	<input style="width: 100px;" type="text"/>	<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
3	Have you always done the same thing for a living?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
4	What year where you born?	<input style="width: 100px;" type="text"/>	<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
5	Are you aware of the 'Courida bush' at the shoreline?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
6	During the time you have lived here, have you noticed any changes to the Courida bush or shoreline at Mon Repos?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	6.a Can you tell me about these changes, any impact they have on you and what might have caused them? (Time scale)		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
7	Do you consider the Courida bush being at the shoreline to be good or bad (or both) for you?		<input style="width: 20px;" type="checkbox"/> Good <input style="width: 20px;" type="checkbox"/> Bad <input style="width: 20px;" type="checkbox"/> Both <input style="width: 20px;" type="checkbox"/>
8	Do you use the Courida bush or shoreline area?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	8.a In what ways?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
9	Are you aware of any other uses of the Courida bush?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	9.a Do you think any of these uses damage the Courida bush?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
10	Can you tell me are there alternatives to using the Courida bush or shoreline for the following uses/actions:		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	10.a Cutting for seine poles		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	10.b Kitchen garden poles		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	10.c Grazing animals e.g. goats		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	10.d Pulling fishing boats in		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	10.e Dumping garbage		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	10.f Firewood		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
11	Do you think the Courida bush should be protected?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	11.a Why do you think that?		<input style="width: 100px;" type="text"/>
12	Have you experienced flooding in Mon Repos from overtopping (not drains/ rainwater)?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	12.a How many times since you've lived in Mon Repos?	<input style="width: 100px;" type="text"/>	<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	12.b Is overtopping currently a problem?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
13	Do you worry about the threat of flooding from overtopping?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	13.a Do you take any actions to protect yourself/household from overtopping?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
14	Do you think that the Courida Bush can help to prevent overtopping from the Sea?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
15	Are you aware of any past projects to plant Courida bush at Mon Repos?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	15.a Were you involved?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
16	Are you aware of the Mangrove/ Courida bush Management Project at NARI, Mon Repos?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	16.a Where did you hear about it? (radio/television/newspaper/schoolchildren/billboard/word of mouth/other)		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	16.b What can you tell me about the project?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	16.c Have you had any involvement with the project?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
17	Would you like to be involved in the project?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
	17.a In what ways?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
18	What can NARI do to get you (or others in the community) involved?		<input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/> <input style="width: 20px;" type="checkbox"/>
Any questions/comments?			Thank You!

Livestock & Kitchen Garden Questionnaire

- 1) How long you live in Mon Repos?

- 2) What is your living?

- 3) Do you have a kitchen garden? If yes, do you ever use the Courida bush for your kitchen garden?

- 4) Does your household have livestock?

Sheep	
Goats	
Cows	
Other	

- 5) We're trying to find out how many people in this area have livestock, can you tell me if it is:

Every household	
Every other households	
A few households	
No households	

6) Where do you graze?

7) Do you ever graze at the sea wall/ shoreline?

8) Why do you graze there?

9) What are the alternative areas for grazing besides the shoreline?

10) Do you think there are stray animals that graze in this area?

NDC Interview Prompts

My name is Katherine and I am student from the UK. I have come to Guyana to study community involvement in mangrove management at Mon Repos and am being hosted by NARI

I would like to interview you for your opinions on the community and mangroves at Mon Repos for use in my project. If there are any questions you would prefer not to answer please don't hesitate to let me know and you may stop the interview at any point. I am using a voice recorder to make sure I don't miss anything that I don't get written down.

- 1) Could you tell me what the role of the NDC is?
- 2) What do you consider the main benefits of the presence of mangroves at Mon Repos?
- 3) In what ways are you aware of the community at Mon Repos using the mangroves and shore line?
- 4) Do you think any of these uses/actions do you consider destructive to the Mangroves?
- 5) Are there currently alternatives to these uses/actions? Or alternatives proposed?
 - Livestock
 - Garbage

- 6) Have you noticed any changes to the mangroves or shoreline at Mon Repos?
- 7) Are you aware of the NARI mangrove management project?
- 8) What would you consider the main motivations for people at Mon Repos to become involved in the mangrove management project?
- 9) Have you noticed any change/impact in usage since the mangroves were declared protected?
- 10) Is there an active CDC in Mon Repos that you are aware of?

Is there anything else you would like to add or to ask me?

Thank you