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Limits and barriers to transformation: a case study of April Ridge relocation initiative, East Honiara, Solomon Islands.

Contact addresses:

Michael Otoara Ha'apio
Research Student – PhD in Climate Change
Pacific Centre for Environment and Sustainable Development
The University of the South Pacific, Suva, Fiji

Dr Keith Morrison
Director, Sustainable Community Development Research Institute, Canterbury,
New Zealand.

Dr Ricardo Gonzalez
Assistant Professor of Environmental and Resource Economics
Department of Forest Sciences, Faculty of Agricultural and Forest Sciences
Universidad de La Frontera, Chile

Dr Morgan Wairiu
Deputy Director
Pacific Centre for Environment and Sustainable Development
The University of the South Pacific, Suva, Fiji

Professor Elizabeth Holland
Director
Pacific Centre for Environment and Sustainable Development
The University of the South Pacific, Suva, Fiji

Abstract

Increasing vulnerability to extreme environmental events (EEEs), exacerbated by climate change, is making adaptation inevitable for rural communities in Small Islands Developing states (SIDs), including the Pacific Island Countries and Territories (PICTs). Particularly the communities' located along the coastal areas that are experiencing sea level rise and coastal erosions, storm surges and flooding. Governments and development agencies across the Pacific have begun to implement adaptation policies to climate change at the community level to build resilience. This paper reports what limits and barriers rural household face for long-term adaptation, using community relocation from Mataniko Riverside to April Ridge, East Honiara, Solomon Islands, as a case study. Two hundred forty six (246) families were affected by the flash flood of Mataniko Riverside in April 2014. The Solomon Islands government offered flood victims plots of land in an area safe from flooding. As of July 2015, the date of the study, the relocation process had been stalled, with flood victims still waiting for the promised plots of land. Questionnaires, oral interviews and focus group discussions with flood victims were used to identify the limits and barriers faced. Vulnerability, flood prone area and changing weather patterns were identified as major limits, whilst government failures and the socioeconomic reality of these households found to be major barriers to adaptation. Among the government failures we discovered a complicated land-tenure system, the absence of infrastructure development at the new site, inconsistent commitment to ensure completion of the land transfer to the settlers, and the lack of access to credit. Socioeconomic attributes including insufficient income, lack of formal education and skills, and consequential limited livelihood alternatives, also act as crucial barriers. Our findings indicate the need to design a relocation policy that addresses the limits and barriers identified here, specifically the land tenure system, and the financial support available to facilitate the relocation process.

Keyword: Adaptation, Barriers and limits, Climate Change, Extreme Environment Events, Relocation.

1 Introduction

Adaptation to climate change impacts is inevitable for rural communities across the Solomon Islands and the Pacific region, due to the increasing intensity and frequency of extreme climate events. Coastal communities are particularly vulnerable. While rural communities have been practicing forms of adaptations for decades (Agrawal & Gibson, 1999), adaptation methods and practices at these coastal villages and communities are often inadequately coordinated and implemented. Despite the fact that rural village communities have been trying to become more resilient to negative impacts of such climate related events, they also face constraints to achieving longer term adaptation. In this paper we use the adaptation model of Islam et al. (2014), which addresses the limits and barriers that reduce people's ability to identify, assess and manage adaptation risks in an effective way, and the natural, technological, socioeconomic and institutional factors that affect personal well-being. The model implies that authorities must ensure the cost-effective allocation of resources to minimize the identified limits and barriers of the process, in order for rural communities to benefit from the implementation of long-term adaptation models. Failure to focus on these limits and barriers will lead to ineffective adaptation at the community level. We have adapted the model to avoid ambiguity that arises in terminology, to more explicitly consider the various scales at which the adaptation process operates, as well as to include a more nuanced understanding of what drives the adaptation process.

About 85% of the population of Solomon Islands live in rural households and rely on subsistence agriculture, forestry and marine resources (Albert et al., 2012). The high dependency on natural resources has strained productivity, which eventually leads to illegal fishing techniques and methods (Ha'apio et al., 2014). Over the past decades, people from the rural villages have increasingly migrated to Honiara, the capital city, looking for employment and better sources of income (Kabutaulaka, 2001). An increasing number of domestic migrants have settled on squatter settlements (Bennett, 2002), which currently comprises 35% of the city's population (HTCPB, 2015). Squatter settlements have been rapidly spilling over into adjacent customary land, where some settlements are reportedly growing at over 9% per annum (SINS, 2012). According to Keen & McNeil (2016), most of squatter settlements lack basic services such as water and electricity, road access, drainage and sanitation, and consequently are ill-

equipped to deal with severe weather events. In addition, these quasi-legal settlers are residing on lands with no tenure security.

During a flash flood in 2014, the homes of 248 families, most of them squatters who had illegally settled in flood prone areas, were destroyed at Mataniko Riverside (Keen & McNeil, 2016). In their effort to rehabilitate these families, the government promised to relocate them to a new site, now called April Ridge, near Gilbert Camp Aekafo and Lau Valley, in East Honiara. The purpose of the relocation was to ensure that the settlers had access to land, which could be used to re-build their homes on, and their livelihoods. During 2014, the government selected surveyed and subdivided April Ridge land into individual plots to be transferred to the affected families. In spite of the initial quick government response, the relocation process has not been executed as planned. This has caused the affected families to move and settle illegally at the new site, without acquiring legal titles.

The rationale behind this paper is to inform readers that coastal villages and communities are facing the increasing intensity and frequency of disaster events due climate change. In order to adapt to these increasing climatic events, policy makers should design a strategy that enable vulnerable communities especially those in coastal areas to resettle at safer locations. This paper therefore, analyses the relocation process of Mataniko Riverside community in Honiara, Solomon Islands and why it is stalled. It analyses the limits and barriers to long term adaptation and recommends alternate solutions for coastal communities and villages to adopt in the future adaptation programs.

2 Limits and barriers to long term adaptation

Barriers to adaptation can prevent the development and implementation of adaptations programs (Adger et al, 2009). Due to the presence of barriers, high adaptive capacity does not necessarily translate into successful adaptation (O'Brien et al., 2006). Barriers to adaptation arise due to certain factors in adaptation programs, such as the nature of the systems involved or the larger context within which the people and systems operate (Moser & Ekstrom, 2010). Adaptation programs are, however, not the only scale at which adaptation occurs. It also occurs at a smaller, single project scale and a larger, political scale that includes national policymaking. Barriers and

limits to adaptation programs can be overcome by clarifying the adaptation processes that occur simultaneously at these multiple scales (Morrison & Singh, 2009).

According to Huang et al. (2011), adaptation to climate change is an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. It is well known, however, that local adaptation measures are often reactive and short-term (Bohle et al., 1994), which can limit the scope for adaptation and become barriers for long-term adaptation. Morrison (2016) has clarified that short-term reactive maladaptation occurs due to confusion over the purpose for adaptation, or, to use the above definition by Huang et al. (2011), confusion over what is meant by moderating harm and beneficial opportunities. The latter depends on the scale at which adaptation is being considered. What is, however, common across scales is the “horizon” of the over-riding purpose sought to be achieved (Morrison, 2016). Clarity about the “horizon” provides reforming endeavours with coherence of adaptation processes across scales. With this clarity, it is possible to see how limits and barriers to local adaptation measures emerge at multiple spatial and temporal scales (Adger et al., 2005). Coherent sets of adaptation measures at multiple spatial and temporal scales are necessary; otherwise maladaptation occurs (Morrison, 2016). There can, however, be multiple successful adaptation options at each scale. They are what “human scale development” theory has defined as the multiple possible “satisfiers” to ensure that essential human needs are met (Max-Neef et al., 1991; Ekins & Max-Neef, 1992; Morrison & Singh, 2009).

The distinction between needs and “satisfiers” is important for understanding adaptation and resilience. This is because, even though there is a fixed set of universal needs, “satisfiers” are continually developed. The more adaptation options (“satisfiers”) there are, the greater flexibility and hence adaptive capacity (Rappaport, 1979). Therefore, a key function of policy and planning is to ensure innovation for providing multiple sets of “satisfiers”, that are coherent across multiple scales of the adaptation process.

Failure to develop at least one set of coherent “satisfiers” across all scales results in maladaptation. It arises when particular “satisfiers” are confused with essential needs, and so are achieved at all costs, which results in a reduction of adaptive capacity and flexibility. Such mistakes produce hard, non-negotiable reactions at a specific scale that are liable to create constraints at other scales.

Transition management research has modelled the multiple scales of adaptation (Geels, 2002; Foxon et al., 2009), defining three scales of adaptation through ecological metaphors. “Niche” refers to local innovative projects; “regimes” to programs institutionally mandated by policies; and “landscapes” to cultural norms and political processes (Morrison & Singh, 2009). Whereas transition management research models a purely bottom-up process whereby local innovative ideas and practices emerge in a “niche” and eventually transform “regimes” to modify “landscapes”, innovation occurs at the regime and landscape scales but is shaped by innovative personnel through creative dialogue with collaborators operating at different scales. This is how we see a process of transformation potentially guided by the same “horizon” that can provide long-term societal goals and integrates adaptation across all scales. We argue that clarity about the nested multi-scaler adaptive processes could help dialogue between personnel working at different scales, for example through the use of ecological metaphors provided by transition management research.

Limits and barriers to climate change adaptation at all scales usually increase the cost of adaptation, especially through the cost of planning and implementation (Klein et al., 2015). Therefore, seeking coherent sets of “satisfiers” can increase the efficiency of adaptation. Most importantly, however, it is necessary to avoid limits to adaptation, as limiting constraints are what lead to outright maladaptation rather than only inefficiency. Limits are the insurmountable factors that constrain effective adaptation to climate change (McCarthy et al., 2001). These limits are faced when thresholds associated with social and/or natural systems are exceeded (IPCC, 2012). They can, however be avoided altogether through innovative development of multiple sets of possible ‘satisfiers,’ which can be both varied and synergistic. On the other hand, there are also conditions or factors that render adaptation to climate change difficult without creating maladaptation. These are defined as barriers to adaptation (Nielsen et al., 2010), which are often mutable (Adger et al., 2009) and can be overcome with rigorous effort, creative management, change of thinking, prioritization, and related shifts in resources, land uses and institutions (Moser & Ekstrom, 2010). The process of overcoming barriers is therefore a process of innovatively developing multiple sets of “synergistic satisfiers” to increase the efficiency and flexibility of adaptation. Therefore the same process makes it possible to overcome both limits and barriers to adaptation.

3 Case study sites

The study covers two sites: the Mataniko Riverside, a flood prone area along the Mataniko River in the urban area of Honiara, and the April Ridge site, a peri-urban grassland located eastward Honiara that is free from flood risk. Mataniko area has from 13 to 23 days of rain per year (WWCI, 2016). According to Ogo et al. (1987), the average rainfall in Honiara, historically 3,000 mm per year, is increasing annually. More frequent rainfall has been recorded during November to April, while higher rainfall drops during May to October (WWCI, 2016).

The flood prone area of Mataniko River side was occupied by informal squatters who have relatively low income, poor infrastructure and are highly depend on the informal economic sector for their livelihoods. Although the newly allocated land area at April Ridge is sloping and not well terraced, it is more fertile than the flood prone area at Mataniko Riverside. After the flood, the government's intention was to relocate about 246 families, that were identified as flood's victims whose homes and food gardens were lost and, and with it their livelihoods. The Ministry of Lands, Housing and Survey surveyed the land in preparation for the formal allocation and transfer of lots to respective families. This would have provided the victims the ability to participate in agriculture such as farming, poultry or piggery for selling at various market outlets in the city. Given the better location and proximity to reach city market outlets, settlers would obtain relatively larger profit margins compared to village producers. Therefore, their ability to deal with limits and barriers to adaptation slightly increased at this site.

4 Data gathering

The study adopted a mixed method approach for data collection, employing qualitative and quantitative techniques. The primary respondents were mainly household heads that were affected by the flash floods of Mataniko Riverside in 2014. Primary data were collected by a survey at the household level, interviews with key informants, and focus group discussions (FGD). A total of 8 focus group discussions were made. For the survey process, we randomly selected 150 households from a total of 246 and, 82 responded to the surveys. Secondary source data were collected from several ministries and a literature review.

The field work was conducted by the principal researcher of this project during two visits, from 19th October to 18th November 2015, and 25th January to 13th March 2016.

4.1 Methods

Before the household surveys and interviews were applied, the principal researcher explained the objective of the research project to the respondents, in order to ensure that they answered the questions genuinely.

Semi-structured questionnaires were carried out before the individual survey. The interviews were made to experts and also household members other than the household head, such as spouses, sons and daughters and relatives, in order to verify the household head respondents' views on their socio-economic attributes. For example, expert opinions from the government and the Honiara city council were intended to inform the effectiveness of the planning and implementation of the relocation initiative. These engagements were critical to ascertain the types of limits and barriers the government officers and city representatives perceived in regards to the relocation process.

Household surveys focused on the rising socioeconomic attributes of the 60 randomly selected households. It aimed to determine the income range, expenses and any monetary surplus, which would be available for possible adaptation investment. Each questionnaire contained four sections with a total of 85 variables. Questions covered topics such as the family's sources and level of income, the number of family members, how they judge their farm operations in the previous years compared to the current year, the types of commercial activity in which participants were involved, the constraints they faced in their adaptation program" and income sources, among others.

Oral interviews aimed at obtaining information from flood victims regarding their experience, in particular challenges they faced to relocate. Focus group discussions were intended to determine the participants' agreement or disagreement about the relocation strategy, and how the national and local governments and relevant stakeholders had planned and implemented the initiative.

5 Results and Discussion

We analysed data for emergent themes, which were then categorized according to the five categories of limits and barriers to adaptation defined by Islam et al. (2014), plus the added a category of land tenure system (See Table 1). To maintain participant anonymity, we assigned numbers to respondents from 3 to 60. The exceptions are interview numbers 1 and 2, which were assigned to the two village chiefs, and therefore are inherently identifiable.

[INSERT TABLE 1 HERE]

5.1 Natural limits

We have identified increased flooding risk and changing weather patterns as the main natural limits. Because of the high rain frequency and volume, villagers surrounding the river always expect floods. The respondents are reluctant to build permanent homes in fear that their homes will be destroyed by a flood. According to Respondent 3, “we are just living temporarily at this site because the rain might fall heavily again and cause a flood to destroy our homes.”

April Ridge area: Almost a third of the 10.72 hectares of the identified land is sloping. The area has a lower flooding risk than the Mataniko riverside, but also lacks any pre-existing infrastructure such as electricity, water and roads, resulting in serious limitations to long term adaptation. One of the respondents confirmed that, although the land may be fertile, the lack of appropriate urban development makes it vulnerable to flooding, soil erosion and waterlogging during rainy seasons. Chief Michael Fa’abona said “the lower grounds may be suitable for farming, but given the lack of a drainage system during rainy season it collects pool of water which is not favourable for cropping.”

5.2 Technological barriers

Mataniko Riverside – The residents, especially those with homes built illegally, expressed concern that there are no barriers along the river bank to stop or divert floods from reaching their houses. These barriers may consist of dykes, channel systems, tree plantations along the riverside, or any other innovative technique to decrease the risks from flooding.

April Ridge- Respondents at this community highlighted the need to build proper roads and drainage systems. Chief Michael Fa’abona said that, “there is no proper road to this site and we have to carry our building materials and other goods long distance to this site”.

Oral interviews - We also found that some respondents have lost confidence in weather forecast by Meteorology Office. For example, respondent 5 stated: “I lost confidence since they are imprecise and inconsistency in the accuracy of their forecasting”. To achieve longer term adaptation, the population should be educated about the probabilistic nature of the forecasting system, and how recognizing weather patterns by themselves. Simultaneously, the Meteorology Office must adopt the latest technology in weather forecasting, improve coverage of meteorological stations, especially in key sensitive points to sentinel in advance catastrophic events, and employ skilled personnel in satellite technology. The lack of adequate forecasting technology is counter-productive and maladaptive.

5.3 Economic barriers

Mataniko Riverside - Economic barriers are more pertinent in Mataniko Riverside than in April Ridge because Mataniko Riverside dwellers do not have enough land space for gardening. Traditionally, these villagers depended on subsistence agriculture (gardening) on small plots of land for their main source of income. Now, because of frequent flooding and scarcity of land, they have turned to selling general goods in informal markets, and selling handcrafts. Some have also turned to fishing. Chief John Toki of Mataniko Village said “the settlers nevertheless consider fishing a risky activity due to cyclones, and most of them do not want to continue to fish. Some, however, consider they have no option but to continue in it to support their livelihood”. A number of barriers prevent them from replacing fishing with work in other sectors. Key respondent interviews identified low income, lack of access to credit to invest in alternative livelihood activities, scarcity of land and land infertility as key barriers.

April Ridge - Chief Michael Fa’abona stated that, “people of this area express that their hope and opportunities were quashed by lack of access to capital from the formal banking institution because of low income”. Respondents mentioned that access to credit would enable them to diversify their activities. As Respondent Number 9 said, “We are poor and do not have sufficient

access to credit and therefore we cannot increase our capacity to sell extra to meet the city dwellers' demand for agricultural produce”.

Interviews showed that, neither the Ministry of Agriculture and Livestock (MAL) or Ministry of Commerce, Industries, Labour and Immigration (MCILI) provide financial assistance to these settlers. Instead, banks are the main lenders to the people within the country. However, banks can only provide loans to customers that have assets (land, bank savings), which a majority of settlers could not provide if they submit a loan proposal. A senior Business Industrial officer within the MCILI confirmed that, in the early 90's, loan facilities for settlers were much better than because of the Development Bank of Solomon Islands (DBSI) (now defunct) used to lend agricultural loans to villagers.

Without access to credit from banks, other sources have had to be relied upon. Respondent 13 said, “A few of the villagers had received financial assistance from their member of parliament, but these were not enough to even start up or sustain the agriculture business”. Also, in a few cases, financial constraint has forced farmers and villagers to borrow money from community members at interest rate ranging from 20% to 30%. According to the Village Chief of April Valley, “when we borrow money from other community members, we have to repay the principal plus interest. If we do not pay on the promised date, the interest accumulates and often finds ourselves in this cycle of debt”.

Lastly, the Chief Planning officer within the MLHS insisted that “the flood victims must pay normal land acquisition fees before their allocated plot of land could be transferred to them”. According to Keen and McNeil (2016), the cost of the allocated plots range from SBD\$30,000 to \$70,000 (Equivalent to USD\$3,800 to \$8,900). This was corroborated by interviews with the April Ridge Chief Michael Fa'abona. Respondents found, however, that the charge is impossible for them to pay. Respondent Number 16 from April said “we are poor and how could we pay the hefty fees? “Chief Michael Fa'abona of April Ridge summed up the difficult situation: “If the government (MLHS) is serious about the relocation of its citizens, it should waive some of the charges to the participants to ensure resilience of the communities in the longer term”.

In sum, settlers recognize the need for diversity, but there was lack of willingness by institutions and government to facilitate it through access to credit. Even though community members appeared to be aware of what was needed for their long-term resilience, they were constrained from doing so by institutional limitations.

5.4 Social barriers

Mataniko Riverside - Social barriers are also more pertinent in Mataniko Riverside than April Ridge. Long term adaptation to climate change and extreme environmental events are constrained by lack of knowledge and skills for alternative livelihoods, and limited by the availability of alternative livelihood activities. As it was expressed by Respondent 17, “Due to low levels of education, villagers struggle to obtain formal employment in the city. Most are settlers who decided to reside in town instead of returning back to their respective villages/communities to utilize their farming and fishing skills. Further, they do not have relevant knowledge and skills for formal employment”.

It was explained during an oral history interviews from Mataniko River side that villagers are illiterate and not qualified to get jobs in the formal sector; “we do not have any other skills other than farming or fishing to change our professions” said the Respondent 7. Most of the flood victims claimed lack of higher education because most of them were displaced employees of the Solomon Islands Plantation Limited (SIPL) during the ethnic tension. They used to work as cheap labourers in the plantation because of lack of education and skills.

April Ridge. Chief Michael Fa’abona, “I was one of the few educated persons at our community to attend secondary and tertiary school and we must encourage better education if we want to improve our standard of living”. Now, some of the children in the settlements are also progressing up to high school education level. Chief Fa’abona continued to say that “only by obtaining higher education will help us to indirectly benefit through gaining employment that will alleviate our families from poverty and assist us to build resilience”.

At April Ridge, there is a privately established school that provides early childhood education (ECE) for the residents ‘children. However, after completing their early childhood education, children must travel into the city to attend primary and secondary schools. According to Chief Michael Fa’abona, the government should consider investing in primary and secondary schools at the community if it is serious about building long-term adaptation at the community level. Community members intuit that improving their long-term resilience requires increasing their adaptation options. They were seeking to expand their adaptation options by developing the opportunities that formal education can provide, without losing the resilience that subsistence

skills provide. They were actively seeking to develop multiple satisfiers, which increase the flexibility of their livelihood (Rappaport 1979).

5.5 Formal institutional barriers

Lack of institutional capacity was found to be a widespread cause of multiple constraints to the adaptation process. The main institutional barriers identified were the lack of an urban development plan for the flood prone area, the lack of a relocation policy programme, poor land tenure system and poor infrastructure development by the government.

Mataniko Riverside- Respondents expressed that, since the majority of the people have moved to April Ridge and other parts of the country, the relevant authorities should commence transforming the river side into a proper residential community of the town. Chief John Toki said, “Now, since the area is not that heavily populated as before, the responsible authority should commence with proper planning, construction of barriers against future floods and converting the area into urban housing zone area”. The respondents claim that the Honiara city council has now create a formal town development plan, with one of its objectives to stop residents erecting homes less than 100 meters close to the river bank (Honiara Local planning scheme, 2015¹). However, as Respondent 15 expressed it, “It requires strong institution to enforce such important development legislation, to ensure people adhere to not rebuilding their houses close to the riverside.” Now many houses are built less than 20 meters away from the riverside and thus will continue to be exposed to floods.

April Ridge- Almost all interviewees blamed the MLHS for delaying the transfer of land titles to the flash flood victims. According to Chief Michael Fa’abona, the flood victims will never rebuild their livelihoods if this process is not completed. “These people need land to start building their homes and to participate in agribusiness or other small businesses”. He continued to say that, “the government has secured the land with the intention to rehabilitate and assist the flood victims, therefore the land should transfer to the victims without delay”.

¹ The Local Planning Scheme is prepared for Honiara City Council by the Physical Planning Division of the Ministry of Lands, Housing and Survey and supported by the Secretariat of Pacific Community (SPC).

Insight into the institutional limitations was provided by Respondent 20. They expressed that the government, donor aid partners and implementing agencies should shift their focus from a project to a programme focus when designing and implementing their adaptation initiatives. From a functional perspective, programs generally require policies to mandate them, whereas projects can be developed in an ad-hoc manner. It was pointed out by respondent No.20 that previous adaptation activities implemented by the COM were also project oriented and focused, and when the duration of the project lapsed there was no continuity or ownership of the project by the beneficiaries, causing most of the adaptation projects to fail once the duration of the project expired. Respondent 20 further explained that, after the flood, donor aid partners provided funding through relevant authorities for projects to assist the flood victims relocate from the affected site, but only for about 3 months after the flood. Because of the land tenure complication, the relocation has now taken more than two years, and funds are no longer available to complete it. Respondent 20 continued by saying, “If the government takes ownership of the relocation process as a program rather than as a project, it would help overcome the issue of a project setting a precedent”. To make this change would require addressing formal institutional barriers brought by lack of policies.

Another insight into the situation was provided by several respondents who pointed out that the relocation of Matakino Riverside was promised by the government immediately prior to the national general election of 2014. While politicians appeared to enthusiastically initiate adaptation measures, a portion of government proactivity may be attributed to election agendas and not reflect the actual resource capacities. Nevertheless, the politicians did initiate an option that initially resonated well with community expectations, fulfilling the criteria for coordination between local and government efforts. However, the reforms lacked the institutional capacity to be fully implemented.

5.6 Land Tenure system

According to the Chairperson of the Flood Victims Committee (FVC), the plots of land are supposed to be transferred to the victims free of charge. This statement was contrary to the Ministry of Lands Housing and Survey officials, who stated that land must be paid for by the flood victims. It is unclear what the source of the confusion was. Whatever the actual reason for the confusion, it delayed the relocation. As explained by the Senior Land officer in the

government, “these plots of land are crown land, and therefore although priority is preserved for the flood victims, they have to go through the normal process of tender for the land’. The process ceased to be vigorously pursued after the subdivision in 2015.

The failure to transfer titles appears to be due to the government having not yet decided on a policy for allocation of the land to the flood victims. According to Flood Victim Committee Chairperson the government has already subdivided 268 20m x 20m plots of land into urban development plots at April Ridge, which is more than adequate for flood victims to complete their recovery and commence the rehabilitation of their livelihoods. The process only stopped because government intervened and changed the process. A Senior MECDM officer cross-validated that the lack of reliable government relocation policy prevented the MLHS from transferring the land and relocating flood victims. As such, “the government is reluctant to set precedents for future relocation initiatives across the country” as most communities are vulnerable to some form of extreme event and climate change. Besides, since announcing the relocation process, most victims aggressively see the opportunity for them to own land in the capital and settle at the areas even before government had approved the details for relocation. Therefore a purely institutional hurdle appears to have become a major barrier if not limit to the success of the relocation.

Besides, the government did not construct a proper road between Honiara City and the April Ridge community. Residents have to walk for 40 to 50 minutes from the main road to reach the allocated plots of land. Chief Michael Fa’abona commented: “Before the government allocates plots of land they should ensure proper roads are constructed to ease with development at the site”. This prevents the April Ridge residents from developing livelihood options that would otherwise be available to them and oversight by the government”. Moreover, because there is neither a health centre in the community, it is difficult for the sick, weak and children to seek medical assistance. “The closest health centre takes us almost two hours walk to reach” said the village Chief. Interviews with relevant institutions were not able to provide any reasons for the oversights in planning by the government.

Once again, the community appears to be well aware of what facilities would enable them to take best advantage of the relocation, but it seems that there was lack of coordination between government institutions in developing a coherent relocation plan.

5.7 Cultural barriers

Human adaptation to climate change is a heterogeneous process influenced by natural limits and barriers, economic, technology, social, and formal institutions, (Nielsen, & Reenberg, 2010), land tenure systems, and also cultural perspectives. Relevant literature now increasingly acknowledges that factors such as class, gender and culture play a large role when choosing or rejecting adaptation strategies at the local scale (Denton, 2002). For example, when making decisions of whether to move from Mataniko Riverside to April Ridge, men more frequently made the decision to move compared to their spouses. Some women expressed that there was not proper water, sanitation and health facility at the new site, but submitted to their husband's decision and agreed to move. According to a female respondent, "if only our male counterparts could listen to some of our concerns then we would not have experienced some of the difficulties as encountered during our relocation process".

6. Conclusion

The main limits to adaptation identified in this case study were: vulnerability wrought by a flood prone area, changing weather patterns and the varying topography. The corresponding barriers were poverty and the lack of institutional clarity about land tenure, in particular no government policy on relocation. Poverty is further related to the lack of access to credit, lack of formal education and, lack of subsistence skills. Government's failure is referred to the fail in providing infrastructure development at the new site, to limited alternative livelihood sources, unfavourable financial support by local and national governments and, no commitment to ensure completion of land transfer to the settlers.

While residents of these two sites participate in their own adaptation strategies, they are also forced to cope with the limits and barriers in their endeavour to adapt. The natural and economic limits are similar for the two communities, while technological, social and formal institutional barriers are more contextual to each study site. The limits and barriers are also interrelated and at times overlapped and combined to constrain adaptation.

If the government is serious about long-term transformation of these people, it should prioritize the building of infrastructures such as roads, electricity, telephone services, water, schools and health centres for residents before embarking on a relocation initiative. Given the interrelated nature and combined influence of these identified barriers, overcoming them is

complex and requires planned and calculated adaptation strategies. The full extent of the range of adaptation options (“satisfiers”) to fulfil the needs of a community has to be appreciated in the planning phase, or else the resilience of communities can be further threatened, rather than enhanced. The planned adaptation should include zoning and relocation of communities to areas that would minimize the impact of climate change risks on the communities. In addition, both internal and external factors pose barriers to adaptation at these sites, and some barriers are reinforced by others. To overcome these barriers, planned adaptation should occur at multiple scales through dialogue of personnel between sectors and with the community.

There is a need for personnel in the various government ministries to show innovation, to provide a diversity of options for multiple solutions by proposing new policies where necessary, and also to seek coherence of policies across sectors through dialogue with personnel from other ministries and sectors. There appears to be a need for greater innovation and pro-activity to be shown by public servants.

There is also a need for institutional reform to allow access to less expensive credit and to improve enforcement of by-laws to avoid the creation of vulnerable livelihoods in flood zones and coastal communities. Designers and implementers of adaptation must also shift their strategy focus from projects to programs. This will assist in providing a sense of continuity, and thus achieve long-term adaptation by helping overcome institutional inertia against adaptation.

Finally, pro-actively helping settlers build their capacity to create alternative livelihood activities would help diversify their incomes, and therefore position them better to overcome identified barriers and limits. In particular, the findings indicate a need for further study into the determinants and implications of the limits and adhering to the land tenure system, particularly when government owned land is involved. When there are both customary and formal land tenure systems co-existing in the socio-cultural and political “landscape”, it is necessary to suggest alternate options that governments could consider when designing a relocation policy.

7. Policy Implications

The findings of this study provide an opportunity to make several specific policy recommendations that may be internationally applicable.

1. Relocation is vital for long-term resilience of communities, especially coastal communities threatened by natural limits to adaptation. While it may be an easy concept to implement in the rural areas, where there is a common land tenure system, it becomes very complex in semi-urban centres where land ownership and tenure security is in question. Therefore, explicit policies on relocation are necessary to identify vulnerable communities and enable a smooth relocation process.
2. Cost is one of the main identified barriers preventing effective adaptation and such responsible government's ministries should investigate ways of establishing micro-finance schemes for community residents, to enable them to start up and expand their businesses to facilitate adaptation. Reforms could include establishment of a scheme guaranteed by the government for rural dwellers to obtain loans from commercial banks with lower interest.
3. Finally, further in-depth studies are needed in order to move towards an improved characterization of the multi-scale temporal and spatial process of adaptation and to identify the most suitable means to overcome the limits and barriers at the coastal community level.

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Table 1: Limits and barriers to adaptation at April Ridge, East Honiara, Solomon Islands

Category of Limits and Barriers	Themes from respondents
Natural limits	Frequent rain and flooding in the area. Steep sloping land.
Technological	No construction of hard structure such as dykes, barriers or blockade, detached breakwaters to prevent floods into the community.
Economics	Very low income and no access to credit facilities. Lack of access to markets.
Social	Lack of education, skills and livelihood alternatives. Lack of strong cooperation amongst households.
Formal Institutional	Lack of re allocation policy, Lack of re allocation plan (e.g. a plan including the proper urban development of the new site, including road construction, health services and schools), Lack of coordination among ministries (bureaucracy and lack of political will, e.g., Delay in allocation of land), Lack of micro credit government sponsored institution, Lack of law enforcement (e.g. to control illegal settlement and illegal urban development in flood prone areas).
Further institutional category: Land Tenure system	There is no policy in place for relocation and state land could only acquire by normal land acquisition process.