Community-Based Vulnerability and Adaptation to Climate Change in Rural Vanuatu

Report No. 1 (September 2008)

Community Vulnerability Assessment: Mangaliliu Village and Lelepa Island, Northwest Efate

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Introduction

Report No. 1 presents preliminary results from fieldwork conducted with the Mangaliliu/Lelepa Island community in mid 2008. This case study forms one of three assessments of community-based vulnerability and resilience to climate stress in rural Vanuatu undertaken as part of a PhD in Geography.

In addition to the Mangaliliu/Lelepa Island case study, assessment was undertaken with Tangoa Island (South Santo) in 2006 and will be undertaken with Nerenigman Village (Mota Lava, Banks Islands) in October/November 2008. The assessments will be combined, and a final report produced in 2009, including potential implications of climate change, and recommendations for community-based adaptation pathways in rural Vanuatu. Report No. 1. examines the factors and processes generating vulnerability to current climate only, as a baseline for assessment of potential implications of future climate.

The assessments are conducted within the context of adaptation to climate change. Adaptation to climate change is increasingly approached from a 'vulnerability' as opposed to 'impacts' perspective, particularly at local scales. This approach involves beginning assessment with the conditions in a system of interest that influence the effects of climate and climate change, rather than starting with scenarios and potential impacts of modeled future change. Typically, this involves examining factors influencing vulnerability to past and current climate stress before inferring implications of future climate. Reducing vulnerability to current climate is a crucial component of adaptation to uncertain future climate.

Vulnerability is complex and place-specific; the factors and processes influencing exposure to climate stresses, and the ability to cope with these, are rooted in the conditions of every day life. Local perspectives of climate stresses and the factors influencing these are likely to differ from outside or 'expert' perspectives. Often, the range of stresses influencing vulnerability to climate (and indeed a multitude of other external stressors) are mis-represented, underrepresented or overlooked in higher scale adaptation processes (including funding, policy, institutions and operations).

Understanding the types of factors and processes generating vulnerability at the local scale is therefore imperative. If 'adaptation' means reducing vulnerability, it must target stresses that are a reality at the local scale – whether or not these are obviously related to climate or climate change. In many cases, addressing only 'direct' climate-related problems is putting the cart before the horse in a rural community context. Sustainable adaptation at the community scale often requires finding creative ways to address local concerns and priorities whilst increasing adaptive capacity and minimizing exposure to current and (sometimes) future climate stress.

Project aim and objectives

The vulnerability assessments contribute to answering the question: *To what extent does the mainstream international policy approach to "adaptation" enable or constrain community-based adaptation in rural Vanuatu?*

To answer this, specific objectives will be addressed:

1. Develop an initial conceptual model of community-scale vulnerability to climate change, based on the literature

2. Document and characterize the nature of vulnerability and resilience to climate variability and extremes, in three case-study communities in Vanuatu. This involves determining the factors and processes that influence exposure-sensitivity and adaptive capacity

3. Identify the range of potential future changes in climate that will be locally relevant for the communities

4. Infer generalisations of community-scale vulnerability and resilience to climate change in rural Vanuatu in order to 'scale-up' local insights

5. Generate a final 'scoping' conceptual model of community-based vulnerability and resilience specific to rural Vanuatu, in order to characterise adaptation needs at this scale

6. Compare the types of activities required to meet community-based adaptation needs in Vanuatu to the types of activities qualifying as 'adaptation' under the mainstream international policy approach

The vulnerability assessment presented here contributes to Objective 2.

Intended applied outcomes

Case study assessments aim to illuminate 'local reality'; to identify the range of multiple stresses influencing vulnerability - and resilience - to climate. The research provides in-depth analyses of the structure of vulnerability and resilience in rural Vanuatu by a comparison of different community contexts. Understanding vulnerability and resilience requires direct climatic impacts to be placed in a wider situational socio-economic, cultural, political and historical context - an understanding of which can only be achieved through lengthy and locally integrative research.

Various vulnerability assessments have been conducted in Vanuatu over time, most recently as part of the preparations for their National Adaptation Plan of Action (NAPA)

completed in 2007. This research is intended to complement these by providing concentrated as opposed to rapid assessment. The research will provide depth to complement the breadth achieved by past assessments aimed largely at 'stocktake' and the identification of critically vulnerable regions and sectors. The Capacity Building for the Development of Adaptation Measures in Pacific Island Countries (CBDAMPIC) project (CIDA-SPREP) targeted more in-depth assessment in 2005 by employing a participatory approach to examine local interpretations of vulnerability to climate. The research builds on insights gained from these assessments, which although inclusive, by necessity remained fairly rapid.

Additionally, there are areas of Vanuatu for which any 'formal' assessment is lacking - including Northwest Efate and the Banks Islands. Case study sites have been purposefully chosen to contribute to filling these gaps. The intended applied outcomes, therefore, are to improve Vanuatu's assessment basis from which to implement aspects of their NAPA by:

a) Improving understandings of the factors and processes shaping vulnerability and resilience to climate in rural Vanuatu, and;
b) Providing assessment in geographical areas where no formal assessment currently exists

Methodology

Fieldwork employs a qualitative and participatory approach to assess the nature of current vulnerability in each community. The focus is on local perceptions and experiences of the impacts of, and ways of coping with, climate stress. Instead of targeting particular sectors such as fisheries, health or infrastructure, interviews and activities aimed to draw out the types and significance of various problems in local eyes. A 'historical analogue' approach became most salient - examining impacts and responses to memorable climate events from the past. Examining the ways in which exposure-sensitivities and coping strategies have changed over time is a particularly effective way of identifying important root causes and drivers of vulnerability.

Fieldwork was conducted with the villages of Mangaliliu and Lelepa Island (Natapao village) over a 4 week period. Approximately 3 weeks were spent living in Mangaliliu, and 1 week on Lelepa Island, over the period July 12th to August 14th 2008.

The main methods used were:

- Semi-structured interviews
- Informal discussion
- Timeline construction and discussion
- Participant observation and log book

Participants were mainly individuals with a broad knowledge of the community and its history such as member of the chief's council and leaders of committees. The majority of participants were older members of the community. A roughly even number of men and

women were involved although timeline discussions involved older men only. Individuals engaging in a range of livelihood activities were also targeted. Interviews and discussions often involved two or three participants. Many participants were revisited multiple times to follow up on specific points.

Interviews were generally structured around the following points:

- General important changes in the community over time
- Problems in and concerns about the community
- Types of weather that causes problems
- Impacts of this weather
- Ways of coping with the impacts
- Significant weather events from the past, impacts and coping etc.
- If a similar event occurred today, what would be the differences?

The methodology is intended to be flexible. A number of participatory tools can be used to complement interviews and discussions; for instance, assessment with Tangoa Island included seasonal calendars, mapping and focus group brainstorming. It is recommended however, that these be employed only as appropriate – participatory tools only serve their intended purpose in the right context. In the case of Mangaliliu/Lelepa, participants were more comfortable with the interview/discussion format as opposed to group activities and the rapport this enabled facilitated excellent insights to be gained.

Field site description

Although they identify as one community Mangaliliu and Lelepa Island (Natapao Village) essentially operate as two separate villages; each has a discrete governance system, its own church, and its own school. Mangaliliu village was established in 1983 due to population pressures on Lelepa Island. Mangaliliu is approximately 25 kms from Port Vila. Lelepa Island is a further 10 minute boat ride from the coast of Mangaliliu.

Both villages are coastal. The majority of dwellings and buildings in Mangaliliu are located a significant distance from the sea and coastal vegetation remains. Dwellings and buildings on Lelepa Island are, by necessity located closer to the water; the village is built on a fairly narrow shelf between the sea and a steep hill and little coastal vegetation exists.

In the last census (1999), the populations of Mangaliliu and Lelepa were 147 and 350 respectively. This is likely to be approximately 200 and 400 currently. Both villages utilize fertile land on the 'mainland' of Efate Island for gardening (family rights) and 'dark bush' resource extraction (mainly common property). Little fertile land exists on Lelepa Island. Land tenure appears straightforward, with lineage-related rights fairly clear and disputes easily resolved by a strong local governance system. Most families have a number of different land areas that they utilize for gardening.

The majority of households engage in subsistence gardening, growing yams, banana, taro, manioc, and island cabbage for consumption. Breadfruit is also an important food

source. Subsistence fishing occurs, although not substantially. Local crops are largely supplemented by rice, tinned meat, tinned fish, biscuits, bread, and other bought goods. Mangaliliu and Lelepa both have a number of locally owned stores providing food, soap, kerosene, phone cards etc.

Income is generated in a number of ways with most households engaging in a range of strategies. Selling laplap and sometimes garden produce at the market in Port Vila is the most widespread, with fishing, sandalwood extraction (not plantations), handicraft sales, tourism, small business (such as community stores and transport services), 'fundraising', and employment in Port Vila also prevalent. It is important to note that a considerable amount of money is generated through royalties from land leases, with an increasing number of households deciding to lease pieces of land to foreign investors.

Mangaliliu's water comes from a freshwater spring close to the village. A tank (close to the source) and pipes supply water to a multitude of taps throughout the village. The water is abundant and of excellent quality. Lelepa Island has no significant ground water. Rainwater is collected in private and public tanks throughout the rainy season. During the dry season, water is collected in plastic containers from creeks on the mainland.

Three main types of building have been present in Mangaliliu/Lelepa over time: traditional round 'hurricane houses'; houses constructed of local materials with either four walls (Figure 2) or an A frame shape (Figure 3); and 'whiteman' houses constructed of iron or concrete block, sawn timber, nails, and cement (Figure 4 and Figure 5). The last traditional hurricane house is thought to have existed on Lelepa until the 1970s. 'Whiteman' houses are currently the most prevalent, particularly on Lelepa. Mangaliliu has more total or partial 'kastom' houses than Lelepa Island. These are constructed mainly of bamboo walls, hardwood supports, and a wild cane or Natangura (sago palm) thatch roof (see Figure 2).

Vulnerability assessment results

Vanuatu is subject to climatic variability and extremes. Vanuatu's latitude places it in the path of tropical cyclones, and it is subject to cycles of El Nino and La Nina, which, respectively, increase the risks of droughts and floods. Future climate change and sea-level rise threaten to exacerbate the risks posed from tropical cyclones, coastal and river flooding, coastal erosion, heavy rainfall events, and droughts throughout Vanuatu. Obviously, physical risks vary according to local geography.

When asked about climate stressors, tropical cyclones, drought and heavy rain were most commonly identified by participants. Residents of Mangaliliu often identified heavy and prolonged rain as the most problematic due to susceptibility to small-scale flooding in the village. Heavy rain had been experienced in early 2008 (caused by La Nina conditions), meaning this was fresh in participant's minds[1]. In contrast, residents of Lelepa frequently

[1] In January 2008 649.1mm of rain fell. This is the highest recorded rainfall (records start from 1953) at well over twice the average of 277.6mm

identified drought as a significant issue, influenced by a lack of water source on the island. This was the only significant difference between the villages - both similarly identified tropical cyclones as a threat, and the underlying factors influencing vulnerability were mostly common to both.

The most significant impacts of these three climate stresses and prevalent mechanisms for coping with them are summarised below in Table 1. Coping strategies are measures taken, and factors important to preventing, preparing for and recovering from, physical climate stress. The table reflects categories of impact as identified by participants themselves through the 'open' research process.

Table 1: Summary of vulnerability to climate, as perceived by local participants. (L) indicates Lelepa only, (M) indicates Mangaliliu only			
Physical climate stress	**Impacts**	**Coping strategies:** X= no longer practiced; S = practiced by a few only	**Notes**
Tropical cyclone *Strong winds* *Heavy rain* *High seas/storm surge (L)* *Major cyclones occurred in 1959(Amanda), 1987(Uma) and 1993(Prima)*	**Changes in shoreline** (1959) (L)		Cyclone Amanda (1959) occurred with extremely high seas which reconfigured the shoreline of Lelepa Island. A beach was created at the Northern end of the villages while the beach at the Southern end disappeared, exposing rocks. Waves reached approximately 20-30 meters inland, damaging houses. Subsequent cyclones in 1987 and 1993 did not exhibit comparable storm surge although a storm in 2001 or 2002 affected a few houses close to the coast. Due to a fairly high population density, many sleeping houses, kitchen houses, toilets and washhouses are currently located close to the sea coast, making them potentially susceptible to a comparable high storm surge (see Figure 1) There are no local restrictions on building close to the coast.
	Damage to houses and buildings *(see Figure 11)* *Damage to buildings and damage to gardens are the most significant impacts of cyclones* *Most houses and buildings were severely damaged during*	*Prevention/preparation:* Radio warning Traditional cyclone forecasting (X) Secure wild cane/thatch roof with coconut fronds and wood (S) Secure iron roof with wood, coral and wire	Cyclone warning is essential to damage minimization; once received, households are able to secure buildings Knowledge remains of traditional weather forecasting with older members of the community. Radio warnings have replaced this since approximately the 1960's. The community received radio warnings prior to Uma (1987) and Prema (1993). Roofs made from local materials (Figures 2 and 3), secured in the local way are equally as strong, or stronger than iron roofs in high winds. Concrete houses are generally regarded to be stronger than

	cyclones Amanda, Uma and Prema (see Figure 6)	Magic (X) Traditional 'harriken hous'(X) 'Old village' location (L) (X) House orientation (L) Save money (S) *Recovery:* Pay for new housing materials (high cost) Sell fish, crabs, shellfish Employment in Port Vila Rebuild with existing damaged materials Rebuild smaller houses Rebuild with local materials (no/low cost) Government relief supplies Family networks Chief directs community work	those with iron walls or local style houses (Figure 4). Hurricane houses were more robust in a cyclone than other styles of local house or 'whiteman' house. Older generations recall living in these in the 1930s. The last hurricane house is thought to have remained on Lelepa island until the 1970s. Little knowledge remains as to how to build a hurricane house. The presence of foreign plantation owners and missionaries around 1900 initiated changes in the style of local house. WWII (1940s) was a significant influence on the change to 'whiteman' house. The recent proliferation of 'whiteman' houses in Mangaliliu-Lelepa is linked to recent land leases Damage to 'whiteman' houses and buildings creates significant economic stress as repairs incur high cost and income generation ability is generally limited following a cyclone. Economic stress was less following Amanda in 1959 as most houses were local style and repairing them was of little cost Rebuilding and repairs are thus often incremental occurring as money becomes available. Fishing is a common income generation activity following climate stress. Some families are still repairing from Uma and Prema Roofs are commonly patched with damaged iron or plastic for months and years. Family networks are important as many live with family for months or years until sufficient repairs are made. In the past, few have had enough money to immediately rebuild. Not many households are thought to have financial savings for hard times Despite the potential for economic stress, many households aspire to 'whiteman' houses and will build if finances allow Other reasons for reductions in the prevalence in local style houses over time are less wild cane (people no longer cultivate this in gardens and land use changes); reduced knowledge and incentive

			amongst younger generations; time and labour required; longevity (local house needs replacing every 5-7 years) Tents and some iron/timber/nails etc. were sent as relief following Uma and Prema. Community networks assist those particularly affected in rebuilding and providing shelter
	Damage to reef	Abstain from reef fishing	Increased sediment can cause sickness if reef fish are consumed. No long term damage
	Damage to gardens affecting food security and income generation *(see Figure 12)* *Damage to gardens and damage to buildings are the most significant impacts of cyclones* *Cyclones Amanda, Uma and Prema caused extensive wind and rain damage to most crops*	*Prevention/preparation* Plant large yam gardens with yam surplus (X) Yam 'selection' and storage (X) Food preservation (X) Plant taro Taro pit storage (S) Plant wild yams Plant multiple gardens Agricultural calendar Harvest mature crops Cut manioc foliage (Figure 7)	Traditionally, activities part of the general agricultural calendar, preservation techniques, and consumption of 'hardship' crops minimised food shortages in the incidence of a cyclone. These activities were more significant to food security following Cyclone Amanda (1959) than Cyclones Uma (1987) and Prema (1993) due to increasing consumption of whiteman' food over time Traditionally, a surplus of many varieties of yam were produced in large yam gardens. Large yams were saved via a specific selection process and stored (by hanging or on raised frames) following harvest. These were saved for times of food shortage and ceremonial contributions. When stored correctly, yams would keep for up to a year. Households had geographically diverse gardens to minimize probability of total damage. These practices are no longer widespread due to: smaller and fewer gardens per household, loss of 'kastom' yam varieties, loss of selection and storage technique knowledge, less crop diversity, and loss of general agricultural knowledge and practice. The last time yams were selected and hung to store is thought to be 2005 Planting occurred in August/September so that yams are mature enough to harvest March-July the following year before the onset of cyclone season. This is dependant on intensive effort preparing the garden though June/July Although this calendar is still generally

		Coping/Recovery: Relief Salvage damaged crops Buy rice, biscuits, tinned meat and fish etc. Sell fish, crabs, shellfish Eat green yam and manioc etc. Eat wild yam, Eat 'hardship' crops: wild Nau (root crop) (X), Neka (vine) (X), Nakaria (root) (X) Plant kumala and corn Food sharing and collective garden restoration organized by Chiefs council	followed, increasingly households are planting and harvesting at the wrong time and this is largely linked to increasing time commitments linked to the need for income generation. Consumption of preserved breadfruit last occurred in the 1930's. Knowledge as to preservation technique has been lost. Contemporarily, 'whiteman' food is fore mostly relied upon following a cyclone. This means food is generally readily available. However, some local crops remain important for supplementing diets of rice and canned goods. Participants recalled malnutrition following Cyclone Uma, particularly affecting children, elderly and pregnant/breastfeeding women due to heavily reliance on rice Most significantly wild yam is an important hardship crop requiring little input. Wild yam gardens are concentrated in creek areas although not all households have these Fijian Taro (Figure 8) is more resistant to windy and wet conditions than other cultivated crops. This is now planted in greater quantities than in the past. Taro will store for up to five months when buried. Kumala is commonly planted following a cyclone as it is fast growing. Kumala is not widely consumed otherwise Salvaging root crops and bananas directly following a cyclone is important as some (particularly taro) can be stored if rot has not set in. This assists with food security in the shorter term Relief (rice and tinned goods) is particularly important in the post cyclone period. Cyclone Uma was the first time relief was received. However, there is concern that people wait for relief instead of salvaging crops, gathering hardship foods, preparation measures such as cutting manioc foliage and harvesting mature crops. Dependence on relief and bought food may discourage rapid replanting, especially among younger generations Food sharing, often directed by the Chiefs council helps to buffer

			food shortages; those sustaining less damage to gardens will share with those sustaining more or who have no substantial gardens Damage to gardens creates significant economic stress as a) food costs are increased for many months and b) many rely on selling garden produce at the market in Port Vila for to meet household costs – including food costs. Few families have savings for 'hard times'. Many sell fish and shellfish to meet food costs during this time Of significant concern is the rising price of rice; this potentially exacerbates economic stress. Few households – particularly in the younger generations - maintain adequate gardening practices to maintain self sufficiency following a cyclone. Because of this, many believe themselves to be more at risk in terms of food insecurity now than in the past; changing quantity and quality of gardening, and increasing dependence on 'whiteman' food means money must be available to meet needs Factors influencing this situation are: increasing community commitments, rise in monetary economy, decreasing gardening knowledge, decreasing traditional education systems, desire for western lifestyle and money, land leases, increasing availability of 'whiteman' food over time Future food security is a significant local concern; increasing population and increasing land leases may limit subsistence gardening ability. However, lack of sustainable financial investment and increasing food costs may increase the need for subsistence gardening.
	Increase in vector and water born disease	Aid post/clinic Port Vila hospital Relief Boil water	The elderly and the young were particularly affected by Malaria and Dengue following Uma and Prema Proximity to Port Vila allows easy access to medical facilities and medicines, particularly post war when the road was built

	Malaria and Dengue fever was a significant problem following Cyclones Uma and Prema especially		Medication comes with relief The use of Kastom medicine is not, and has never been particularly prevalent in the memories of most participants. This is perhaps due to proximity to Port Vila and, during WWII, the US Army hospital at Samoa Point
	Water shortages (L)	Collect and store extra water from the mainland (L)	Damage to iron roofs prevents rainwater capture and storage, in the short and long term This was particularly problematic in 1987 as Uma was followed by a significant drought
Heavy/prolonged rain *Heavy rain was most recently experienced in early 2008* *Rainy conditions extending through the dry season also creates problems*	**Reduced crop productivity** *Heavy and prolonged rainfall causes many crops to rot affecting food security and income generation*	*Prevention/preparation* Plant multiple gardens Plant on the slopes Agricultural calendar Plant taro Plant wild yam *Coping/Recovery* Buy food Harvest crops Eat taro, wild yam Fishing	Yam is particularly affected; Yams quickly rot and will not grow well in wet conditions. Rainy conditions during June-August makes it difficult to clear and burn bush for yam planting, thus affecting the seasonal calendar Taro (Fijian taro) is more resilient to water logged soils, and wild yam is unaffected Gardens must be checked regularly for flooding. Once flooding is apparent, mature crops must be immediately harvested before rot sets in. Immature crops are spoiled Fewer households are thought to do this due to: laziness, increased time commitments, and reduce incentive because of reliance on bought food
	Village flooded (M) *Ground is saturated and flooded up to approximately 30cms in some places*	Dig ditches around houses Divert water away from houses to roads etc. Sleep in raised beds Family networks	Heavy rain causes creeks either side of Mangaliliu to top their banks and causes water to run down the roads causing small scale erosion. The soil does not drain well meaning it becomes swampy. This is exacerbated by the position of Mangaliliu between two streams Water inside sleeping and kitchen houses creates unhealthy and inconvenient conditions. Prolonged wet conditions accelerates rotting in traditional style houses

			Many households stay with family until houses can be dried out
	Damage to reef	Abstain from reef fishing	Increased sediment can cause sickness if reef fish are consumed. Little long term damage
	Increase in water borne disease	Aid post /clinic Port Vila hospital Boil drinking water	Increases especially in diarrhea and scabies in children
Drought *The most significant drought in memory occurred in 1987 following cyclone Uma. A drought also occurred around 1938* *Drought can entail six months to a year with little rainfall*	**Reduced crop productivity** *Prolonged periods of little rainfall causes most crops to fail*	*Prevention/preparation* Food preservation (X) *Coping/recovery* Buy food Relief (?) Eat Neka (vine) (X) Eat wild Nau (root crop) (X) Eat Nakaria (root) (X) Eat wild yam (Naloa) Go fishing	Drought-related damage to gardens is perceived by many as more severe than cyclone-related damage. Cyclones are easier to prepare for than drought, and impacts to gardens are (generally) shorter lived as crops regenerate faster and more resistant crops such as taro are likely to survive. Drought however, causes most crops to fail and replanting cannot occur until rain comes Traditionally, food preservation - particularly breadfruit preservation - was an essential food source during drought. Hardship foods were also essential. This has been largely replaced by consumption of 'whiteman' food Again, drought induces economic stress, as garden failure increases food costs and limits income generation in much the same way as cyclone-induced economic stress. Fishing is important to offset this.
	Prolonged water shortage (L) Water quality decline	Carry water in containers from mainland Use community tanks (S) Use bore water (X) Boil water	An abundance of water tanks exists on Lelepa Island (see Figure 9). Since the late 90's, increasing wealth has enabled many households to install their own water tanks. Twelve community water tanks were installed after independence by the government, and two were donated by an NGO. There is a water committee, but no restrictions on communal water use. Community tanks are especially important for households that have no tanks of their own. However, water tanks typically run dry over the dry season. Households make frequent trips to the mainland to collect water

			from creeks. This is prolonged when a drought occurs, although this is not generally perceived as a significant problem - the presence of the creeks means freshwater is always available, and the quality remains good Additionally, this was traditionally the only source of water - before iron roofs, water capture and storage was not possible. Thus, carrying water from the mainland is a normal part of life Traditionally, water was carried with canoes (Figure 10). The recent proliferation of boats (linked to land leases) makes this easier; however, rising fuel costs contribute to economic stress. Concern exists regarding loss of knowledge among younger generations as to how to make canoes In the 80's a bore was drilled and a diesel pump installed by an aid agency to tap the island's freshwater lens. Taps were installed throughout the village. A committee was established to restrict water use but restrictions were not followed. Overuse caused the freshwater to become saline, breaking the pump in less than a year A significant concern is the protection of creeks with increasing land leases. The land that creeks run through is valuable coastal land. The chief and council have taken measures to prevent this land from being leased through advocating and awareness. However, this remains the only mechanism preventing land leases and concern exists regarding future water access and quality

Figure 1 Buildings are typically close to the coast on Lelepa Island

Figure 2 Local house with four walls and Natangura roof

Figure 3 Local 'A frame' style house with wild cane roof

Figure 4 'Whiteman' house made of concrete with iron roof

Figure 5 'Whiteman' house made of iron. Containers for carrying water are stored outside

Figure 6 House damaged by Cyclone Uma (1987) and abandoned

Figure 7: Manioc. Above ground foliage can be cut before a cyclone, thus protecting the root from unearthing

Figure 8 Fijian Taro

Figure 9 Community water tanks

Figure 10 Canoe

Non-climate factors influencing vulnerability and resilience

The nature of vulnerability to climate has changed over time in Mangaliliu and Lelepa. As is evident from Table …above, non-climate factors play a significant role in vulnerability to climate stress. Socio-economic factors and processes – both historical and current – influence the impacts of these and the ways in which people are able to cope. The most significant non-climate stresses identified by participants are expanded on below.

Figures 11 and 12 illustrate the links between climate and non-climate stresses in the context of cyclone damage to housing and gardens respectively. These figures illustrate social, economic, cultural and environmental factors creating situations of vulnerability to cyclones.

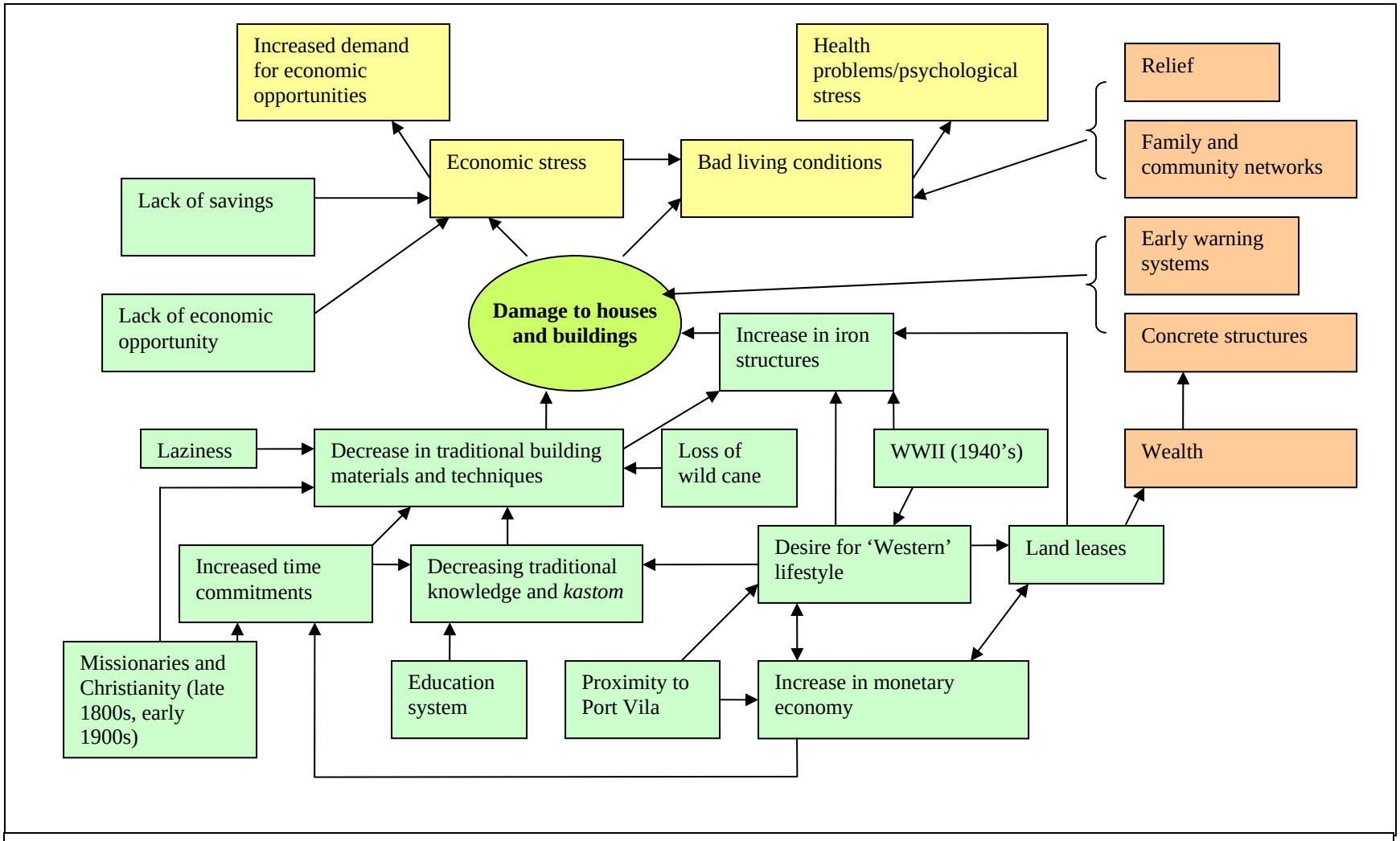

Figure 11 Causes and consequences of cyclone-induced vulnerabilities: housing damage. Blue boxes contain causal factors; yellow boxes contain effects; red boxes contain factors important to coping with stresses

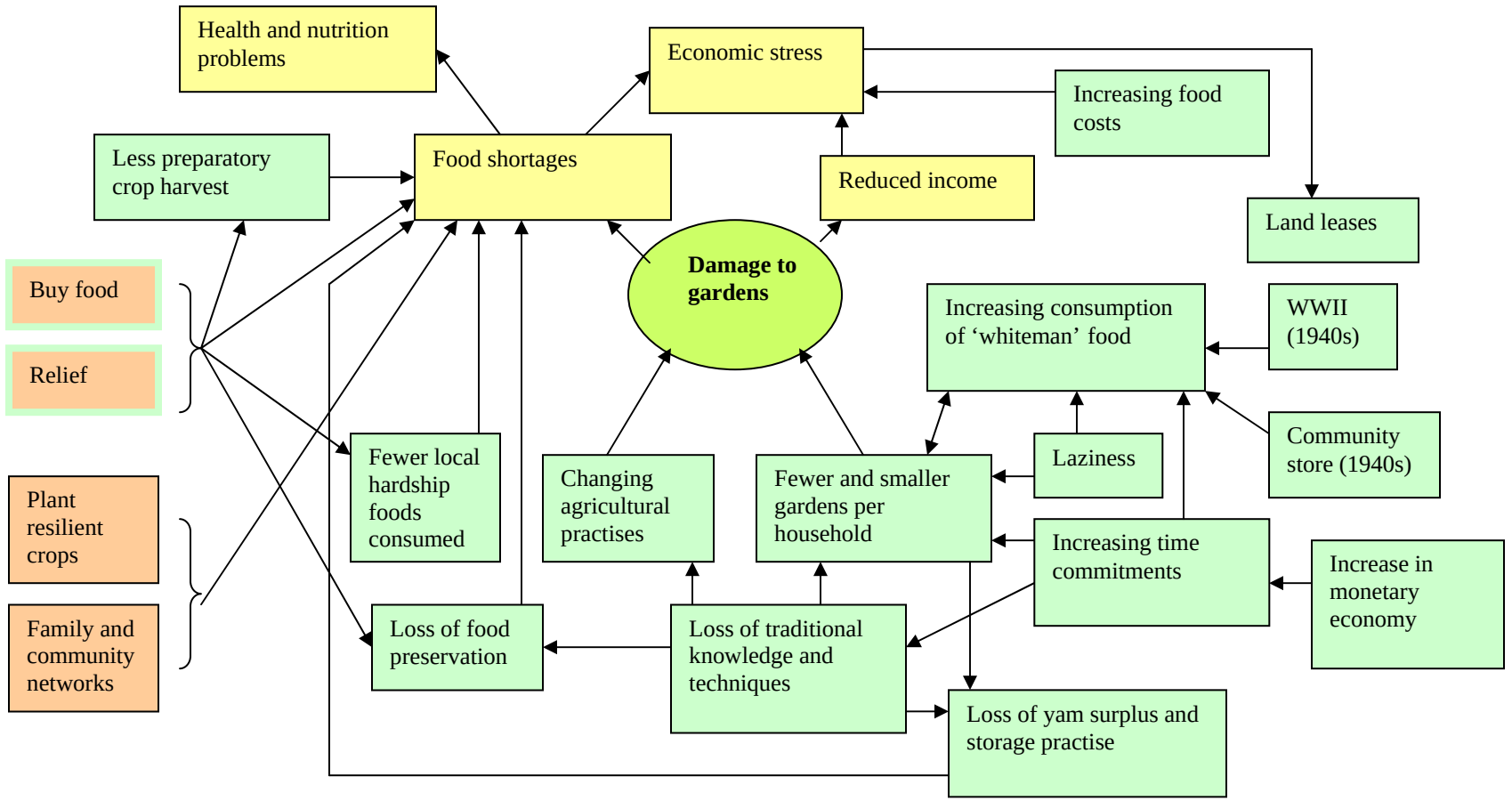

Figure 12: Causes and consequences of cyclone-induced vulnerabilities: damage to gardens. Blue boxes contain causal factors; yellow boxes contain effects; red boxes contain factors important to coping with stresses. Red boxes with blue borders indicate factors that may be causal but are still important to coping. The prevalence of these coping strategies may reinforce aspects of vulnerability. The majority of these causes and consequences are also relevant to drought and heavy-rain induced vulnerabilities.

Discussion

Vulnerability to climate in this case study is closely linked to a situational context of non-climate stresses. Rapid and significant processes of socio-economic change over the past few decades have influenced the implications of climate stress and the ways in which people cope. However, climate stress is not particularly high on the community's list of priorities. For example, when asked about significant problems faced in the community, the majority of participants candidly identified issues related to

- Increased desire and need for money and 'whiteman' goods
- Changing diets and increasing reliance on 'whiteman' food
- Loss of custom and traditional/local knowledge
- Loss of respect and cooperation
- Population growth
- Leasing land
- Increasing food costs
- Lack of education

rather than identifying issues related to climate stress, or linking these issues in any way to climate stress.

This is a particularly important issue to take note of when conceiving, designing, and implementing adaptation initiatives targeted at the community scale; many communities in Vanuatu are unlikely to perceive themselves are 'urgently' or obviously vulnerable to climate stress. This has important implications for the sustainability of community-based projects as motivation to implement or sustain an initiative that does not address community priorities will be low, even if it does potentially reduce the impacts of current and future climate stress.

When discussing the impacts and implications of climate stresses, most participants expressed that these did indeed cause significant disruption and problems for the community. However, on the whole, these problems although inconvenient, are generally considered part of 'normal' life. Coping with them, albeit a strain, was something that was expected and endured in due course. For example, cyclone damage to houses can endure for years following the event, but this is not necessarily perceived as a priority problem. Although inconvenient, it is acceptable to patch up an iron roof with plastic or wood for 5 years until the money can be raised to buy new iron.

It may be that these types of problems are expected, 'familiar' and straightforward to cope with – there was a sense in the interviews that people are generally able to find ways to deal with these periods and have done for generations, although contemporary coping mechanisms may be more ad hoc, than in the past. Changing circumstances may mean that responses are less robust than in the past where there were more standard mechanisms of preparation.

In comparison however, problems of a socio-economic and cultural nature such as those listed above may be less familiar and straightforward to address, making them more worrisome at the local scale. For example, although many participants identified the leasing and subsequent loss of land as a huge concern, few had any ideas as to how this problem could be addressed, and many felt uncertain and worried about the future. It may be also, that non-climate stresses are perceived as chronic problems, while climate-related stress is of a more transient and infrequent nature.

Chief MurMur of Mangaliliu village aptly believed many problems and changes in the community to stem from "fosis blong global" and particular consequences of exposure to these in the village context. The influence of such 'global forces' was evidenced in the timeline constructions - many periods of significant change over time were linked to influences such as the rise of Christianity, World War II, and the current education system. It may be that the community is better equipped and accustom to dealing with externally imposed climate stress than externally imposed socio-economic stressors, given the pace and nature of change.

Of course, coping strategies in Mangaliliu and Lelepa may be, for the most part, sufficient to adequately deal with experienced climate stresses from a local perspective. This is very difficult to gauge however – a 'strategy' may not be perceived as particularly ideal, but with few other options and little point of comparison, participants generally perceived these as 'part of life', being neither particularly good or particularly bad. This is an important point to note particularly in a methodological sense.

Conclusion

Successful CBA involves looking at the causal factors behind the problems, figuring out how these fit into the state of every day life, and finding ways to address the priority concerns of people in the community. Any initiative to minimize current or future climate stress needs to be conceived based on an understanding of the root causes of vulnerability and the factors important to resilience. For instance, attempting to revive 'traditional' gardening practices to reduce vulnerability to food insecurity as an adaptation strategy is unlikely to work without factoring in why practices have changed in the first place.

The nature of vulnerability is obviously very place specific - scaling up findings from limited assessments is obviously a challenge in this respect and can only be useful for some aspects of adaptation. 'Scaling up' by taking the basic direct climate stresses experienced in one place and assuming they exist in similar geographical locations, is currently the norm. However, without comprehensive documentation of the causal structure of climate stress (i.e non-climate issues underwriting this), this may encourage a 'project replication' approach - something to be approached with caution. The purpose of the comparative case studies is to illuminate the types of underlying causal factors that are likely to influence vulnerability. Comparison of different case studies is useful for getting an idea of what the common denominators may or may not be and therefore better understanding the types of activities and arrangements that can target these.