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Climate Change and Social Change: Vulnerability and Adaptation in Rural Vanuatu

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What is the nature of vulnerability and resilience to climate change at the community scale in Pacific island countries (PICs)? What approaches to climate change adaptation are most appropriate at this scale? These questions are examined in the context of rural Vanuatu, a Melanesian least developed country particularly susceptible to changes in climate variability and extremes. Fieldwork on the islands of Santo, Efate and Mota Lava interpreted vulnerability by beginning with local perceptions and experiences of dealing with climate risks. Vulnerability to climate arises from a context of rapid social change. Predominantly 'non-climate' factors such as population growth, land issues, changing traditional governance and eroding traditional knowledge are linked to changing agricultural practices, natural resource degradation, and increasing reliance on imports. These factors and processes affect the ways and degree to which communities are able to cope with climate stresses such as tropical cyclones, drought and heavy rain. However, research findings challenge the common notion that Pacific Island communities are inherently vulnerable; each community engages endogenous mechanisms of resilience. Aspects of this resilience may be threatened however especially where resilience depends on flexibility and self sufficiency, and particularly given increasing climatic uncertainty in the future. In this context therefore, 'adaptation to climate change' requires communities to adapt to both changing climatic and social situations.

1 INTRODUCTION

This paper examines the factors and processes influencing vulnerability and resilience at the community-scale in rural Vanuatu. The purpose of this is to interpret the implications of this vulnerability/resilience for community-based adaptation to climate change (CBA) projects. The importance of community-based adaptation (CBA) is becoming increasingly recognised by institutions involved in financing and implementing adaptation to climate change, particularly in developing countries. For instance, the United Nations Development Programme (UNDP)/Global Environment Facility (GEF) (in partnership with the GEF Small-Grants Programme) has recently launched an initiative piloting 8-20 CBA projects in 10 developing countries (one of which is a Pacific Island country (PIC)). In the Pacific region, the Canadian funded 'Capacity Building for the Development of Adaptation Measures in Pacific Island Countries' (CBDAMPIC) project (implemented by the South Pacific Regional Environment Programme), generated sixteen pilot CBA projects in four PICs - including Vanuatu -

between 2002 and 2005. This project was heralded as the first Stage III[1] adaptation project to occur in the Pacific. With the recent surge in recognition of CBA has come an influx of methodologies and approaches dedicated to identifying "vulnerability to climate change" and, subsequently, "adaptation measures", often in a participatory way. In all these, building adaptation measures from the priorities of local people is explicit. This paper aims to illuminate the way in which local people conceptualise their vulnerability to climate and to highlight some potential tensions between this, and the way in which vulnerability - and subsequently 'adaptation' - is dominantly addressed.

2 COMMUNITY-BASED ADAPTATION AND THE VULNERABILITY-LED APPROACH

Community-based adaptation, as discussed here, refers to 'planned' adaptation such as that implemented by governments, aid donors, NGOs or other organisations at the community scale. In this context, CBA is a group of responses to climate change forming the extreme 'bottom' of 'bottom-up' approaches to adaptation. The concept of CBA has gained popularity in response to the realization that national-level institutions and 'top-down' initiatives for adaptation seldom produce suitable outcomes for vulnerable communities at the local scale in developing countries. The central concern is that communities that are rural, remote, poor and/or marginalized are less likely to receive appropriate national institutional support for adaptation to climate change (O'Brien et. al., 2006; Huq and Reid, 2007).

Although CBA is a relatively new concept, best practise draws heavily on experience from community-based disaster risk reduction, and to a lesser degree, grassroots development and sustainable livelihoods (Allen, 2006; Gutierrez and Mead, 2007; van Aalst et. al., 2008). Much of the experience gained from pilot CBA projects themselves (which is not yet extensive) is from communities 'urgently' vulnerable to climate impacts i.e. those already suffering obvious stress from changing and those living with current extreme climatic. However, the potential application - and necessity - of CBA is far more wide-reaching, given that all communities will eventually experience problems related to climate change. Planned adaptation in those communities not particularly 'urgently' vulnerable may require a somewhat different approach to those facing extreme and obvious stress from climate.

In many respects CBA can be viewed as an additional layer onto community disaster risk reduction and development initiatives (Huq and Reid, 2007; Jones and Rahman, 2007; van Aalst, 2008). The focus is generally on practical, tangible, and feasible vulnerability-reducing outcomes for groups of people (Smit and Wandel, 2006; Uitto and Shaw, 2006; van Aalst, 2008). Essentially, CBA focuses on initiatives that operate at the community level, from inception to establishment and monitoring. The full involvement of local stakeholders is fundamental: "CBA is about the community making choices, not having them imposed from outside" (Jones and Rahman, 2007:18). Therefore, CBA is purportedly about empowerment and building adaptive capacity, both through tangible

[1] As laid out in Decision 11 of the first Conference of the Parties to the UNFCCC, involving actual initiatives to achieve 'adaptation' as opposed to planning and capacity building.

activities and through education and awareness (Allen, 2006). Local 'ownership' of the adaptation process is central and best practise appears to be to build partnerships with local organisations in co-management type arrangements. However, the key to CBA is self-reliance, or facilitating an adaptation process that is locally operable and sustainable with minimal continued outside input. Initiatives purportedly address locally identified priorities and concerns, slot into local decision making structures, utilize local capacity and resources, and build upon activities already underway (Rojas Blanco, 2006; Allen, 2006; Nakalevu, 2006; Uitto and Shaw, 2006; Gutierrez and Mead, 2007). The role of 'indigenous' or 'traditional' knowledge and practices relating to livelihood security and environmental stress are often particularly valued in this process.

Generally speaking, CBA (and other types of bottom-up adaptation) is guided by a 'vulnerability-led' as opposed to 'impacts-led' assessment approach to adaptation. The literature often makes this distinction, based on different starting points of analysis (i.e. see Burton et al, 2002; Smit and Pilifosova, 2003). While impact-led approaches generally begin assessment with scenarios of long term average changes, and focus on 'specific adaptations' to reduce future potential impacts, vulnerability-led approaches begin with stresses – and ostensibly the *reasons* for these stresses - currently faced in the system in question (Smit and Pilifosova, 2003; Ford and Smit, 2004; Smit and Wandel, 2006). As such CBA often reduces vulnerability to current climate stress in the first instance, making it 'no-regrets' or useful irrespective of climate change itself. In many cases (although not all), reducing current vulnerability will reduce future vulnerability since it is *vulnerability* being minimized, not specific impacts.

As the climate change adaptation field is influenced by a large number of disciplines, the notion of 'vulnerability' unfortunately faces considerable definitional issues (see Brooks, 2003; O'Brien et. al., 2006). Vulnerability as applied in most bottom-up approaches to adaptation is borrowed from a number of disciplinary traditions. The food security and entitlements (Sen, 1981), (later) natural hazards (Wisner et. al., 2004), and sustainable livelihoods (Carney, 1998) fields are identified in the literature as having had notable influence. However, most assessment approaches of the bottom-up type are generally based on the IPCC definition of vulnerability[2], and this can be represented by the pseudo equation given by Smit and Pilifosova (2003:21):

[2] "Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of *climate change*, including *climate variability* and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its *sensitivity*, and its adaptive capacity" (Parry et. al., 2007).

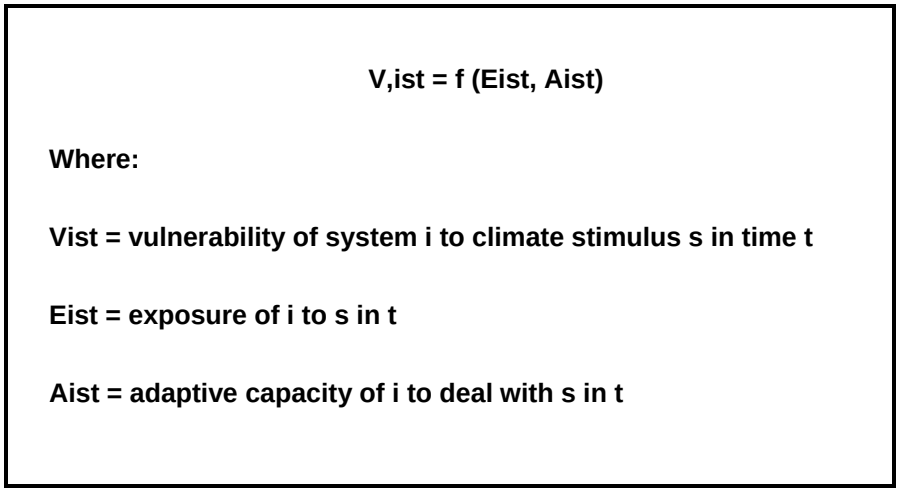

Figure 1: Integrated Model of Vulnerability to Climate Stress (Smit and Pilifosova, 2003: 21)

In practical terms, the real influence of vulnerability research from these disciplines is perhaps questionable - in this definition, vulnerability is inherently climate-stimulus specific (whether it be a current or future climate stimulus). In much of the vast field of vulnerability research, vulnerability is more than merely physical stimulus specific, being both 'chronic and transient', 'everyday and event-centred'; in short, a product of daily life and livelihoods as much as specific climate stress.

This definitional approach is often generally (if not explicitly) employed in practically orientated vulnerability assessments aimed at producing tangible outcomes based on local priority (Smit and Wandel, 2006). The Pacific-based CBDAMPIC programme is a case in point, employing the basic framework shown below (Figure 2) in community-scale assessments.

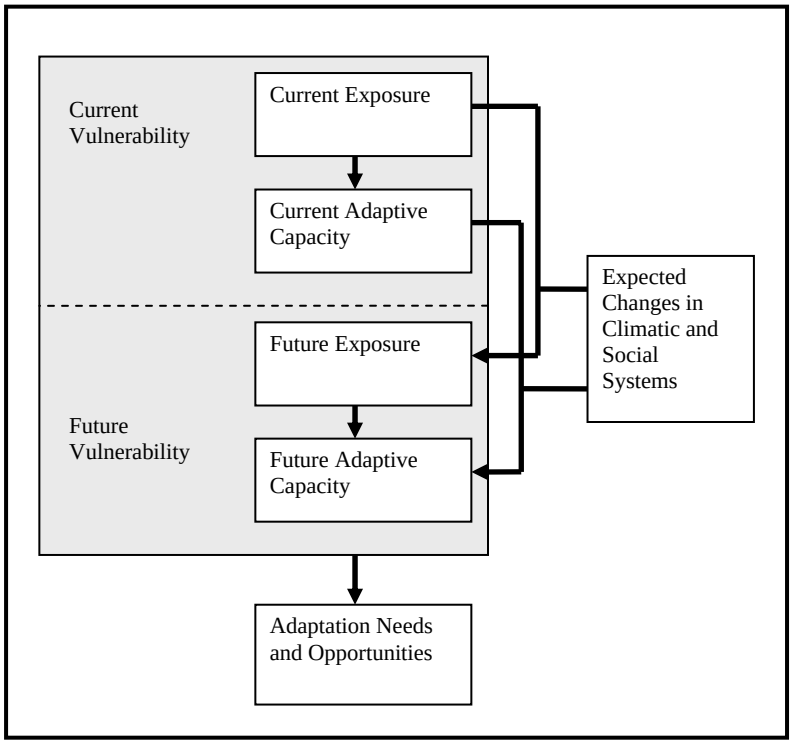

Figure 2: Analytical framework of bottom-up vulnerability assessment. From Smit and Wandel, 2006:228; Sutherland et. al., 2005:12; Ford and Smit, 2005:13; Nakalevu et. al., 2005:17.

This exemplifies how the adaptation outputs from this methodological process are directly linked to specific climate 'exposure' or climate stimulus. 'Adaptive capacity', in this sequence, is also directly linked to exposure, meaning it's definition is close to 'coping' or actions taken to prepare, avoid, or recover from a climate stress. Research questions often asked in assessments are largely along the lines of: What types of climate and weather cause problems in the community? What are the impacts? What do you do to cope with these impacts? If these climate events became worse what problems would that cause? This is with the view of identifying strategies - based on local priorities - to increase the ability to cope with the climate impacts identified.

3 THE CASE STUDIES

To examine the questions set out at the beginning of this paper, research was undertaken with three rural Ni-Vanuatu communities: Tangoa island (Santo), Mangaliliu (Efate) and Mota Lava island (Banks Islands). Case study assessments aim to illuminate 'local reality'; to identify the range of multiple stresses influencing vulnerability - and resilience - to climate in local eyes. As is soundly established in the literature, vulnerability is very much context-specific. Each case study community has a somewhat different geographical, social, economic, political, and historical setting. Communities were selected primarily based upon their relative isolation or proximity to an urban centre and

thus upon the goods, services, and influences available to them: Mangaliliu is very close to Port Vila (the capital city), Mota Lava is extremely isolated, and Tangoa island is somewhere in between.

Thus, to comprehensively compare vulnerability in these different contexts - to identify the similarities and differences and the reasons for these - is particularly useful to increasing understanding about vulnerability, especially in terms of 'feeding-up' local insights to higher scale adaptation planning processes[3]. Unfortunately, a full comparison of the case studies is beyond the scope of this paper; instead, the paper concentrates on one case study site - Mota Lava - in order to reflect on the complexity of factors and processes influencing vulnerability to climate. Despite differing contexts and subsequently differing specifics of vulnerability, some common themes emerged from the case studies and these are drawn upon in the ensuing discussion, thus tying in insights from the other case study communities.

3.1 VANUATU

Vanuatu is an archipelago of over 80 islands with a total land area of 12,300 km^2 spread over around 1,300 km in a north to south orientation (see Figure 3). Islands are mostly volcanic in origin and most have fringing reefs. Roughly 75% of total land area is forested. The population are mainly Melanesian and most speak a form of pigin called *Bislama* (the official national language) as well as a huge diversity of local languages and dialects. Vanuatu is one of the youngest independent countries in the Pacific region, having achieved political independence from the joint British-French condominium in 1980.

[3] van Aalst et. al. (2008) presents a good discussion on the difficulties of scaling-up locally based assessments. Polsky et. al. (2007) emphasises the importance of comprehensively comparing case studies and offers a method for identifying common themes.

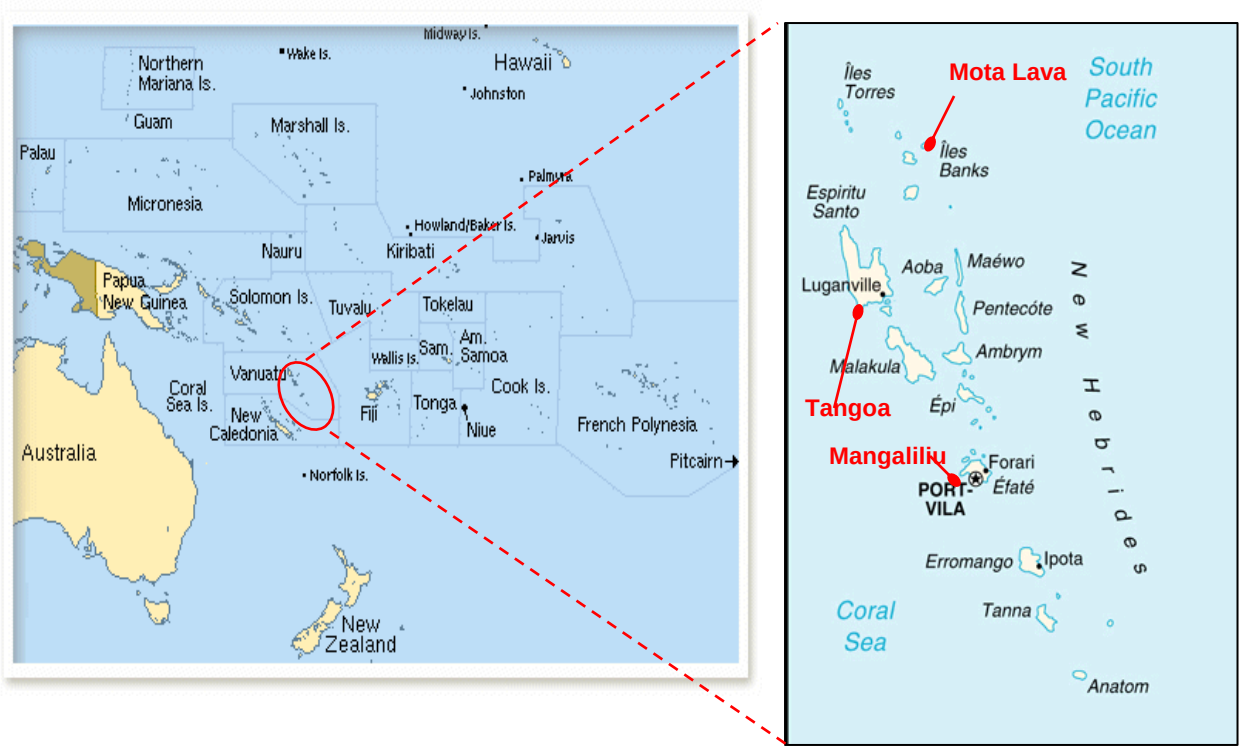

Figure 3: Vanuatu's location in the Pacific ('New Hebrides' was the colonial name for Vanuatu). Field site communities are indicated in red.

The current population is estimated to be 215,000, of which 80% live in rural villages. The majority of the rural population are supported by subsistence agriculture (mainly slash and burn type farming) and fishing. The cash economy is playing an increasingly significant role in rural areas however, the biggest expenses being school fees, imported food, household items and tithes. The service sector (particularly tourism in the main island of Efate), and to a lesser degree agricultural exports and small scale industry contribute most to GDP; Vanuatu currently has a narrow economic base. Due to its geographic extent and development constraints, many islands remain extremely isolated in terms of communications and services.

Vanuatu faces a number of geological and climatic natural hazards. The Commonwealth Vulnerability Index (CVI) ranks Vanuatu the world's most vulnerable country of 111 developing countries assessed. As such, Vanuatu still has UN Least Developed Country (LDC) status, despite a per capita GDP above the LDC threshold. The climate of Vanuatu is inherently uncertain, being subject to climatic variability and extremes. Vanuatu's latitude places it in the path of tropical cyclones (November to May), 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. Exacerbation of extreme events will be the most significant implications of climate change for communities in Vanuatu as opposed to changes in long-term average conditions.

Various vulnerability assessments have been conducted in Vanuatu over time, most recently as part of the preparations for their National Adaptation Programme of Action (NAPA) completed in 2007. The research presented here is intended to complement these by providing depth to complement the breadth achieved by past assessments aimed largely at 'stock take' and the identification of critically vulnerable regions and sectors.

3.2 METHODOLOGY

Fieldwork employed a qualitative and participatory approach to assess local perceptions and experiences of dealing with climate. The author lived in each community for approximately two months between 2006 and 2008. Research initially followed the assessment sequence and questions presented in Section 2 above. Specific methods were drawn from established participatory toolkits for CBA and community-scale disaster risk reduction, in particular the CV&A guide developed by SPREP for the CBDAMPIC project (Nakalevu, 2006)[4]. The in-community assessment was focussed primarily around specific climate stimuli and specific strategies employed to deal with these.

However, as the research progressed, it became evident that this was de-emphasising the issues most important in local eyes - the processes creating 'situational vulnerability' (Wisner 2004), or stresses that are not necessarily directly linked to specific climate stress, but impede the ability to deal with it nonetheless. Local concerns were largely concentrated on more general problems and research participants were more interested in discussing the intersection between these and the changing ability to cope with climate. As CBA is about addressing local priorities, the methods were adjusted accordingly. The basic principals of the framework remained a basic guide, but research questions were expanded to elicit insight on more general problems and concerns in the community in the first instance.

Methods involved primarily in-depth semi-structured and informal interviews with individuals and small groups as this approach appeared to suit the cultural situation most effectively. Interviews ranged from one to five hours in length. Over 100 of these were conducted in total. Participants were both males and females of a range of ages. Community leaders (i.e. Chiefs, church leaders, elders, school teachers, committee chairmen) were heavily involved in interviewing as these possessed in-depth knowledge of the community and its history. Participant observation was also a particularly effective

[4] Other important sources were: The Climate Witness Community Toolkit developed by WWF South Pacific Programme (McFadzien et. al., 2005); the Red Cross/Red Crescent Climate Guide (van Aalst et. at., 2007); the Guidelines for Community Vulnerability Analysis developed by UNDP/UNDHA for the SPDRP (Vrolikjs, 1998), and the principals of the CRiSTAL decision support tool (Hammill, 2007)

method. Timeline construction, seasonal calendars, resource and social mapping, focus group discussions, and trend analysis tools were also employed to supplement, although participants were generally more comfortable in the interview context[5]. A 'historical analogue' approach became most salient - examining impacts and responses to memorable climate events from the past. Examining the ways in which coping strategies had changed over time was a particularly effective way of identifying important root causes and drivers of vulnerability.

5 FINDINGS

5.1 TRADITIONAL RESILIENCE TO CLIMATE STRESS

In all three communities, people perceive themselves as less able to deal with climate stress as in the "*taem bifo*" ("time before"). The most problematic physical aspects of climate faced in each community are tropical cyclones, drought, and heavy rain, although the relative severity of each varies somewhat according to circumstance. According to local participants, their grandfathers and great-grandfathers were (in many ways, but not all) better able to cope with environmental perturbations[6]. This was due to a range of complex mechanisms of risk reduction, some examples of which are provided below in Table 1 alongside some examples of their contemporary counterparts. The reader is directed to Campbell (1990) for a more in-depth historical overview of these in Mota Lava specifically. Campbell (2006) and Mercer et. al. (2007) provide an excellent overview of traditional disaster reduction measures in the Pacific Islands in general.

Table 1
Examples of traditional and contemporary methods of dealing with climate stress, based on case study findings

Traditional risk reduction methods	Application	Contemporary risk reduction methods
Food security		
High garden to family size ratio	Not widely practised	Imported food i.e. rice, flour, ship biscuits, canned goods
Traditional agricultural calendar	No longer strongly adhered to	Disaster relief aid
Surplus yam production and storage	No longer practised	Remittance flows
Tabus on weather resilient wild-yam stocks	No longer practised	

[5] This was an interesting methodological finding in itself. Although there is not space for a discussion here, it will undoubtedly be the subject of a further paper.

[6] It is important to remember however, that in the past climate stress has led to significant hardship such as famine and loss of life (Campbell, 1990); in many societies, people have a tendency to view the past with 'rose tinted glasses'. Changing perceptions of acceptable types and levels of impacts and losses have likely changed over time. One should not assume traditional coping mechanisms to be 'perfect'. In many cases, safety nets afforded by things such as disaster relief aid and the availability of imports, although reducing 'self sufficiency', may prevent losses experienced in the past such as starvation and death.

Breadfruit and cassava preservation	Still produced in small quantities	
Famine foods e.g. *Nayap* root, sago palm starch	No longer utilized	
Housing		
Cyclone resistant building methods: steeply angled roofs, low walls, rope bindings, no windows etcetera	No longer practised	'Modern' style house using local materials: shallow roofs, high walls, nails, windows etcetera
Plant building materials i.e. sago palm, hardwoods.	Still widely practised but declining	Import building materials for iron and sawn timber housing
Tie down roofs	Still widely practised	Disaster relief Concrete block housing
Social safety nets		
Inter-community trading links	No longer practised	Remittance flows
Intra-community resource sharing and exchange	Still widely practised	Sharing limited to within extended family units and to elderly/widows
Chiefs direct collective recovery efforts	Not widely practised	Disaster relief aid
Environmental knowledge		
Home, *nakamal** and 'learning-by-doing' based education system	Not widely practised	Government, donor, NGO and volunteer awareness projects and programmes
Traditional signs of approaching extreme events	Not widely practised	Radio cyclone warnings and weather forecasts

* Meeting house

Importantly, activities, processes and systems that reduced risks posed by climate variability and extremes were woven into the fabric of everyday life and *kastom*[7]. Livelihoods were constructed and maintained in a way that accounted for climate stress based on generations of experience of living with environmental uncertainty. This was not necessarily conscious, but merely part of the way of doing things; yearly, monthly and daily. In all three case studies, participants felt that this is largely no longer the case, meaning that dealing with climate stress is less self sufficient and more uncertain. The reasons are linked to rapid social change, and are discussed below using the case study of Mota Lava.

5.2 CONTEMPORARY VULNERABILITY IN MOTA LAVA

Despite the place-specific intricacies of vulnerability, a common theme emerging from the case studies is that non-climate processes - often identified as prominent general

[7] "*kastom*…is a whole way of life that dictates almost all of one's actions and provides its own particular interpretation for almost everything that happens" (McClancy, 2002: 20)

concerns in the communities irrespective of climate stress - are at the root of most climate problems identified, and that this is quite obvious to local people. This is illustrated below in Figure 4, using the example of tropical cyclone impact on food security[8] in Mota Lava. Mota Lava is one of the Banks Islands in the isolated northern-most province of Vanuatu. The population is approximately 1600 people. Mota Lava is affected most by tropical cyclones as well as drought. Participants in all case studies identified tropical cyclones as among the most problematic of climatic stressors[9]. With climate change, tropical cyclones are "*likely* [to become] more intense, with larger peak wind speeds and more heavy precipitation…" (Alley et al, 2007:16). There is some evidence that the frequency of cyclones will increase also, although this is an area of much debate.

This case is a particularly good example of the intersection of climate and non-climate processes as Mota Lava was affected by Cyclone Funa in January 2008, nine months before the fieldwork commenced. Participants pointed out that although Funa was a relatively minor cyclone (severe cyclones were experienced in 1939 and 1972), food shortages and resultant stresses were the worst in memory and still an issue nine months later. This emphasises the point that although the exposure characteristics (i.e. magnitude, frequency, duration, speed of onset, direction etc.) of a climate stress are obviously fundamental to the degree of damage, perhaps more fundamental are the structures in place to deal with it.

The immediate reasons for food insecurity are presented in the innermost circle of Figure 4. Changes to both general, and 'disaster specific' agricultural and food acquisition practises (see Table 1 for examples) have lead to a condition where food security in the incidence of a cyclone (and other climate stresses faced, especially drought) is a now prominent concern. This is not to say that in the *taem bifo* food security was not a concern - it certainly was (see Campbell, 1990). However, the contemporary ability to obtain sufficient and sustainable supplies of food is perceived to be more uncertain than in the past, and this is attributed mainly to less robust subsistence agricultural systems and increasing dependency on external resources namely disaster aid, imported goods, money and knowledge.

[8] As defined by the FAO, *food security* refers to a condition for all people, at all times, having both physical, social and economic access to sufficient, safe and healthy variety of food, satisfying dietary needs and food preferences while having an active and healthy life in a sustainable manner

[9] Although vulnerability is, to a degree, specific to climate stimulus, when one peels off the 'layers' of influence, the drivers of vulnerabilities are generally similar processes, despite the specific nature of climate stress. Therefore, although the climate stimulus discussed here is tropical cyclone, many of the underlying factors driving these aspects of vulnerability are also relevant to droughts and heavy rain events.

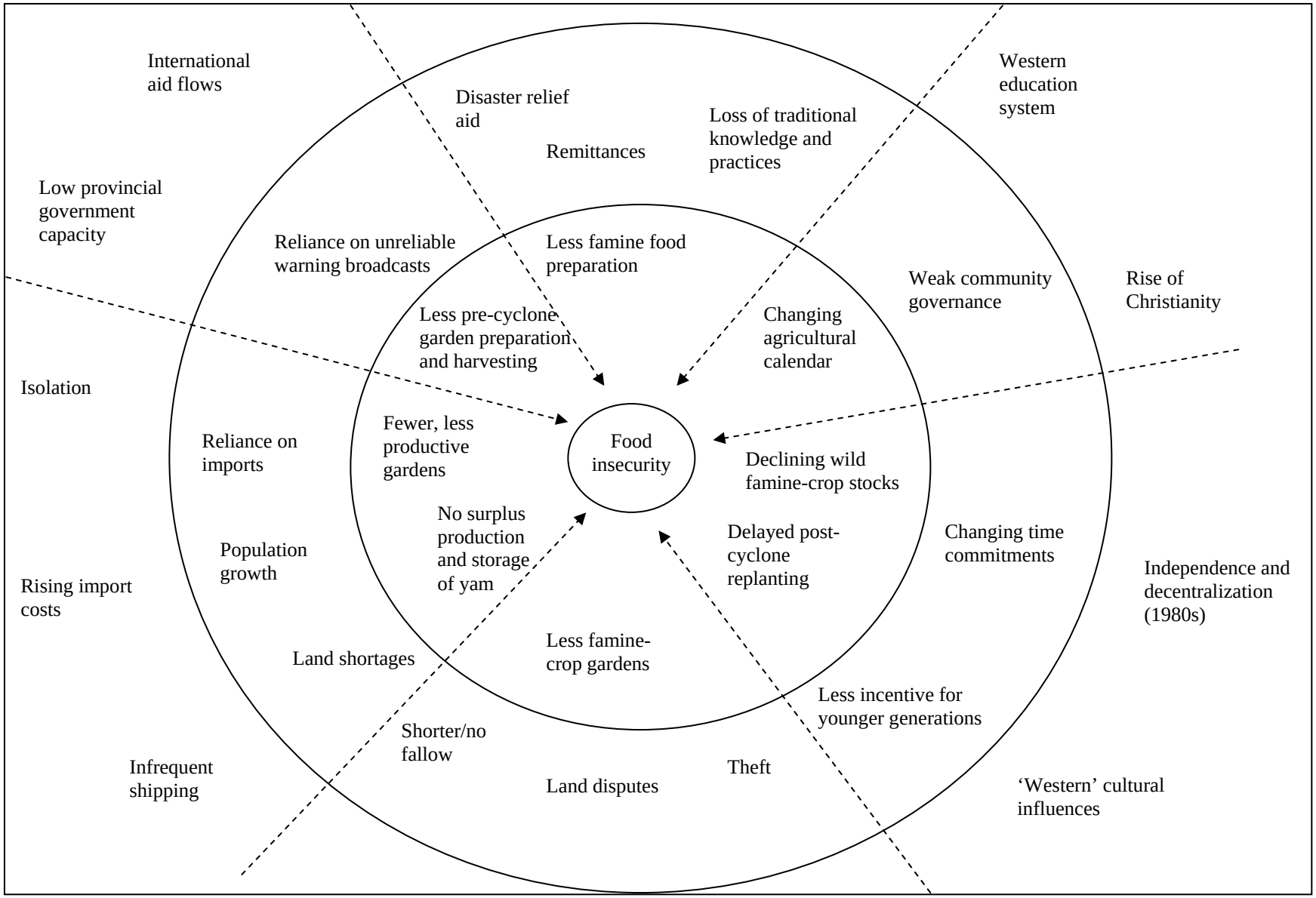

Figure 4: Factors and processes causing vulnerability to food insecurity in the context of tropical cyclone in Mota Lava. Each circle represents one further step of abstraction from the direct agricultural pursuits of the community; these are factors driving food insecurity. The outermost layer contains factors largely outside the direct sphere of influence of the community themselves, although as the arrows represent, these forces have locally specific consequences

Generally, the bigger, more plentiful, more diverse, and more productive a family or individual's gardens, the more crops remain consumable in the incidence of climate stress. In the past, high daily labour inputs, long fallows, specific planting months, and an abundance of land facilitated this. A yam (*Dioscorea spp.*) crop was planted mid-year so as to be mature in time for cyclone season. Amounts of yam surplus to general consumption requirements were grown and stored in houses for celebrations and exchange, also providing a food source in case of shortage. Gardens of extreme weather resilient wild-yam (*Dioscorea nummularia*) varieties were planted specifically in preparation for times of shortage. A further important food 'back-up' was provided by areas of wild-growing yam that were sustained by traditional resource management institutions; community Chiefs would put in place *tabus* (restrictions) on harvesting in times of plenty, and particular harvesting techniques were employed to ensure sustainability of the wild stocks.

Knowledge of changes in weather and environment signalling an impending cyclone enabled mature crops to be harvested and stored in preparation, providing an important food source in the weeks following the event. Immediately following a cyclone, gardens were replanted with a mixture of fast and slow growing crop varieties to ensure rapid but sustainable recovery. Preserving food throughout the year was important: large quantities of breadfruit (*Artocarpus altilsor*) were dried and stored to be consumed in times of shortage, and flour was made from cassava (*Manihot esculenta).* Numerous wild-growing foods not normally consumed could be called upon in times of stress.

However, social, cultural and economic changes in Mota Lava have altered the nature of agriculture and food acquisition to a less self-sufficient form. The perceived importance of many of these traditional processes and activities is declining and many a) are no longer widely prevalent (i.e. garden size, agricultural calendar or b) have been lost altogether (some famine foods, yam storage). Participants were quick to point out the underlying causes of this - these were the issues they were most concerned about in general and felt ill-equipped to address. The most prominent of these are presented in the second circle in Figure 4, although they are far more complex, overlapping and interconnected than the diagram affords.

Gardens are generally fewer, smaller, and less productive than in the past. In general, current labour inputs to gardens are far lower and less regular due to a myriad of factors, most prominently: loss of agricultural knowledge; loss of *kastom* education system and subsequently loss of respect for traditional agricultural practises and ethics; declining interest and motivation regarding agriculture; increasing role of imported food; and increasing time commitments to festivals, church and school. Also, cropping practises and fallow systems are changing. The current fallow on some parts of the island is essentially non-existent due to population growth, land shortages and intra-family land disputes: many are frightened to leave a garden to fallow as extended family members will take over. As discussed in depth by Campbell (1990), changing proportions of crops over time - in short less yam and more 'non-indigenous' crops - have exacerbated this problem by adding an additional stage to the fallow. Importantly, yam (requiring high

labour inputs and fertile soil) is no longer produced in quantities enabling storage, having been largely replaced by the less labour intensive cassava and taro (*Colocasia esculenta*). Unlike yam, other crops cannot be stored for long periods of time, thus removing this source of emergency food.

However, many participants believed population growth, land shortages and increasing time commitments to be largely an excuse for "laziness". Most believed lack of motivation and labour input - particularly among the younger generations - was the real reason for declining productivity of agriculture and increasing reliance on imported food. A younger participant stated:

> "In the talk of my grandfather before, he told me that - in our custom - every day you must first put some plants in the ground, so that if a hurricane hits us we have no problem with food. It is a problem with us now. I can tell you that we are lazy!"[10]

'Laziness' as well as increasing theft, has led to fewer wild yam 'back-up' gardens (the low maintenance wild yam is particularly easy to steal). Concerningly, stocks of wild-growing wild yam have declined markedly in recent years. *Tabus* are no longer put in place or enforced by leaders and sustainable techniques of harvest are not practised, reducing this importance source of famine food.

Increasing prevalence and reliance on imports - in both normal and *desasta* (disaster) periods - has been a major driver of agricultural change (see Campbell 1990 for an overview of the rise of the cash economy and its impact on agriculture). This is self reinforcing however: as subsistence agriculture becomes less productive, the necessity of imports increases. Contemporarily, rice, biscuits, flour and canned goods supplement diets meaning garden size, number and labour inputs required to sustain adequate access to food are fewer. This contributes significantly to reduced incentives to produce subsistence crops substantial enough to withstand a cyclone or drought. In short, greater reliance on imports in 'normal' times means even greater reliance on imports in *desasta* times. In times of food shortage and environmental stress, purchasing these foods from the community stores is a fundamental coping mechanism. It is important to note that this makes coping with disaster easier in many respects as the community no longer relies exclusively on local foods.

However, access to imports is uncertain due predominantly to Mota Lava's isolation. Since Vanuatu's independence in 1980 and the subsequent decentralisation of government, shipping services to the isolated northern islands of Vanuatu are typified by unreliability, infrequency and general overall inadequacy. Community stores frequently run out of rice and flour, and it can be many months before a ship arrives. Rising global food and fuel prices mean the local price of rice and flour is exorbitant and rising. Although limited local economic opportunities exist on Mota Lava, export opportunity is currently near zero. As such, remittances from extensive community networks residing in the urban centres of Port Vila and Luganville enable the purchase of imports (and largely

[10] Bislama: "Long toktok blong bubu bifo, hemi tellem mi se - kastom blong yumi - Evri day…yu mas puttum first sam stamba long graon, makem se sipos hurricane I killim yumi, yumi no gat problem lo kaekae. Em I problem long mifala nomo. Mi save tellem yu se, mifala i laze!"

prop up the cash economy in general on Mota Lava). Unreliable access to imported food is a priority concern in the community of Mota Lava, and the importance of sustaining reliable local food sources is recognised.

The expectation of disaster relief in Mota Lava has had a particularly marked influence on food resilience. Expectation of relief has reduced incentive to ensure self sufficient food security across the board. Expectation of relief stems predominantly from substantial shipments of aid received following major cyclones in 1939 and 1972 respectively. In fact this relief has had significant and lasting impacts on agriculture and diets in general (such as the adoption of new crops) described in detail by Campbell (1990). This is not to say that disaster relief does not play an important role in reducing impact - if aid had not been received following cyclones in 1939 and 1972, famine would almost certainly have ensued in the shorter term. However, participants explained that currently little incentive exists in the community to plant wild-yam gardens, prepare adequate amounts of dried breadfruit and other famine foods, maintain knowledge of famine foods and preparation techniques, produce and store surplus yams, ensure mature crop harvest, and rapidly replant damaged gardens etc.

The implications of this were particularly apparent following Cyclone Funa as disaster relief (facilitated through the Vanuatu National Disaster Management Office) transpired to be meagre and insufficient to offset local food shortages in the longer term (each family received one 25kg bag of rice only, irrespective of family size). However, as one participant put it:

> "Problems with disaster are not problems belonging to you [aid donor countries], they are problems belonging to us"[11].

Many reflected this sentiment, recognising that lack of comprehensive engagement in long and short term local risk reduction strategies is the real problem, not lack of relief aid. Cyclone Funa appeared to have been something of a 'wake-up call'. Local methods of risk reduction still exist (to an extent) in both knowledge and practise, but local people recognise that they are perhaps not utilized to their fullest extent.

Changing traditional knowledge systems underwrite many aspects of vulnerability to climate stress. For instance, many participants - especially younger generations - were either unsure of the traditional agricultural calendar, or were aware but did not follow it. Many older participants recalled their parents gathering and preparing traditional famine foods such as sago palm starch, but were unsure of the techniques themselves as their parents had not passed down the knowledge. Although many older participants were aware of traditional weather signs signalling an impending cyclone, reliance on an unreliable radio broadcast is now the norm[12]. Participants of all ages blamed loss of environmental knowledge on a lack of emphasis on *kastom* education in the community. Formal schooling based on a 'Western' model, means young people have less time to

[11] "Problem blong desasta em I no problem blo yufala [aid donor countries] em I problem blo mifala"

[12] Mota Lava has few working radios, very limited radio reception, and limited telecommunications. As such, the community was unaware that Cyclone Funa was coming and therefore did not make the usual short term preparations.

participate themselves in gardening, story telling, and other activities that traditionally built the knowledge base necessary for both general and *desasta* food security. However, equally as important as the knowledge itself is '*respect*' for the knowledge and thus, the incentive to put knowledge into practise. Participants felt that today, Western education and increasing outside cultural influences is reducing respect for *kastom* systems in general. A complex history of missionaries, the cash economy and indentured labour (see Campbell 1990) has changed the nature of *kastom*. The implication of this for vulnerability to climate stress is that many risk reducing activities, processes and systems woven into everyday life (whether these be directly or indirectly related to climate stress itself) are now of less priority.

A related issue is that of a weak community governance system which, in general, impinges on the community's ability to sort out their own problems. This is a complex product of Mota Lava's history, changes in the *kastom* chiefly system, and overall increasing individualism. Participants (and indeed chiefs themselves) explained that chiefs and leaders often did not fulfil their roles, were often not aware of their responsibilities, and seldom worked together effectively. As such, community welfare matters - such as labour and resource sharing following a cyclone - often fall to church leaders, and as there are seven different denominations on Mota Lava, this is not always a fluid process. The consequences of weakening governance are that, in short a) decision making and planning is very difficult and b) community cohesion is compromised. Thus, although many recognise and are concerned about problems such as eroding *kastom* and knowledge among young people, land disputes, theft, lack of economic opportunity, lack of disaster preparation etc., actually addressing these problems at a community scale is very difficult. The solution to this inertia appears to be to look to outside institutions, finances, and knowledge to help solve problems - resources that are not readily available in the isolated northern islands.

6 DISCUSSION

6.1 THE NATURE OF VULNERABILITY AND RESILIENCE

Case studies reveal that the nature of vulnerability and resilience to climate stress in rural Vanuatu is grounded firmly in factors and processes indirectly related to climate or coping with climate itself. As communities have always lived with a high degree of environmental variability, traditionally dealing with it was (and still is, in many respects) deeply ingrained in culture and daily life. Johannes (1978, cited in Mercer et. al., 2007) notes that traditional strategies are often so ingrained in daily life that the virtues often go unnoticed by 'outsiders' until the practise or system has weakened. Risk reduction mechanisms are becoming increasingly less ingrained. According to local people themselves, the capacity to respond to uncertainty is changing due to a raft of external historical and contemporary pressures. Indeed, situations creating vulnerability are "rooted in the routines, opportunities and limitations of 'normal' or 'daily' life" (Wisner, 2004:190), and these have changed and evolved over time. The nature of vulnerability at the community scale in rural Vanuatu can be typified by an 'unweaving' of risk reduction from daily life and livelihood systems.

As found by Reid and Vogel (2006) climate stress, when it occurs, 'unveils' a range of other stresses that contribute to vulnerability in general, such as poor access to services, restricted access to land, conflict, or disease. In Vanuatu, climate stress unveils problems such as loss of traditional knowledge and cultural systems; limited access to outside resources, services and information; reduced security of subsistence production; increasing import dependency; limited economic opportunity; population growth and land shortages; and ineffective community and provincial governance. It is generally these issues, not issues directly related to climate stress that are of central concern at the community level. When climate stress occurs, these stresses manifest themselves in impacts such as sustained food insecurity, water insecurity, insecure housing, loss of income and health problems. Whilst climate stress has always resulted in these impacts, minimising these is generally regarded to be less effective in the contemporary situation.

The traditional and contemporary ability to deal with climate stress (or adaptive capacity) is shaped by (to simplify), both shorter term coping strategies and longer term processes and systems (this follows the logic of Berkes and Jolly, 2001 in their study of vulnerability in the Canadian Arctic). Longer term processes (largely social and cultural) determine flexibility in coping and the ability to 'bounce back' from a disturbance. As such, this can be termed 'resilience' (Barnett, 2001)[13]. Traditionally, flexibility in life and livelihood was facilitated by particular social institutions, self-organisation, environmental knowledge, community governance structures, customary respect and education systems and cultural values. Thus, what local people overwhelmingly emphasised in the case studies is an *erosion in community resilience.* As the case of Mota Lava's food security following Cyclone Funa illustrates, 'bouncing-back' to an acceptable state from an environmental perturbation is generally perceived to be slower

[13] Resilience is often related to the concept of adaptive capacity in the literature, but the place of it in the definition varies (i.e see Gallopin, 2006).

and less effective than in the past. In the case studies, local people view themselves as being less able to cope with environmental uncertainty than their grandfathers and most of the reasons boil down to reduced capacity for: self protection, self organisation, flexibility in existing coping mechanisms, and generation of new coping strategies - factors shaped by changing social circumstance.

Resilience is shaped largely by an accumulated base of knowledge and experience disseminated through local cultural institutions and systems. Over time, inherent environmental uncertainty created incentives to generate local livelihood systems resilient to this and to disseminate knowledge and experience - whether in regards to, for example, general agricultural practises or acknowledgement of traditional disaster signals. As important as the methods of risk reduction themselves however, was 'respect' for these methods. Changes in the *priority* of risk reduction (both long and short term) at the community scale are a product of complex changing social situations. As a result, the knowledge 'toolkit' from which to currently draw and improve coping strategies is perhaps smaller than in the past. This is not to say that the toolkit and related skill set is not being topped up with modern iterations of knowledge and practise[14]. For instance, methods of agro-forestry and intercropping introduced by the provincial agriculture officer are being employed by some to increase garden productivity. However, changes to the amount and structure of knowledge dissemination within the community means the toolkit is reducing in size and sustainability. There is concern that over time, knowledge and practices themselves will be lost, further reducing capacity to deal with environmental uncertainty.

Surviving climate stress is certainly less self sufficient than in the past, being instead heavily dependant on outside resources and services[15]; most notably disaster relief aid, but also (to varying degrees depending on place) imports, cash earnings, remittances, technology, communications, development aid, projects, and volunteers. While many of these provide important and indispensable safety nets reducing the potential for catastrophe, this dependence may come at the expense of aspects of endogenous flexibility, local innovation, and self reliance in the face of a highly variable and uncertain future climate. As the case of Mota Lava illustrates, external resource flows are not always reliable in an isolated context. What is particularly concerning, is that

[14] It is important to note however, that knowledge introduced from 'outside' such as through awareness and education programmes may have questionable impact due to isolation - the northern islands of Vanuatu are notoriously left out of programmes due to high expense, lack of communications, and resultant difficulty with follow-up and monitoring. For instance, a major aid donor recently undertook an awareness programme advocating the importance of disaster preparation using video. Participants explained that although they enjoyed watching the video, they did not think the message was serious or interesting.

[15] It should be noted however, that 'dependency' in some form has always been present via inter-community networks of exchange traditionally a fundamental part of disaster reduction (see Campbell, 1990). Dependency networks are now generally wider, typified by reliance on resource flows from other countries and the urban centers. Furthermore, some argue that 'dependency', particularly on aid and remittances is a perfectly rational response to global pressures imparted on small island states and does not necessarily equate to vulnerability (i.e Bertram and Watters, 1985; Bertram, 2006). This valid discussion point is beyond the scope of this paper, so given the perceptions of local participants, 'dependency' is considered to contribute to vulnerability, as in its current form resource flows appear to be largely undependable and further outside the control of local people than in the past.

climate change potentially adds a new level of environmental uncertainty to the equation, increasing the importance of self-reliance and flexibility.

Having said this however, each community can be said to retain considerable resilience in that climate stress has not yet created a situation unable to be accommodated or absorbed. Participants were quick to point out that a way to deal with and move on from climate impacts was always found - they have managed climatic uncertainty for generations albeit in different and perhaps more flexible and robust ways. Culturally, environmental and related stress is not generally viewed as a huge problem or priority concern at the community scale. Even in Mota Lava where the impacts of Cyclone Funa were still being felt, participants generally discussed disaster impacts rather light-heartedly, whilst displaying a deep concern for other social and development problems. In this sense, if vulnerability is viewed as 'values at risk' (Barnett et. al. 2008), rural communities are fairly resilient. It is difficult to say, however, whether increasing social and environmental uncertainty in the future may mean that this is always the case.

6.2 IMPLICATIONS FOR CBA

CBA is fundamentally about building adaptive capacity and engendering self-reliance in dealing with climate change. In rural Vanuatu, vulnerability is distinctly both 'event-centred' and 'everyday' in local eyes (i.e. Lavell, 2004). This has important implications for planned CBA: as well as improving coping strategies to deal with specific climate stress, building adaptive capacity requires initiatives to address longer term processes enabling resilience. Rather than being merely about the *methods* of dealing with climate themselves, CBA needs to address the factors and processes *enabling these methods to develop and evolve* in ways suitable to local contexts. As suggested by Wisner (2004), people's capabilities for self-protection are inherent but often not used to their fullest extent. As emphasized by Barnett (2001:10), in the context of climate change and PICs,

> "the pursuit of resilience is integral to the development of adaptive capacity. This is because, as a general if not near-universal rule, an integral feature of resilient systems is an ability to learn from, and reorganize to meet, changed conditions"

Fundamentally, this may require activities seemingly unrelated to climate or climate change itself. Indeed, this may be viewed as more of a 'development' problem. However, without them, initiatives to address merely climate-specific aspects of vulnerability may be somewhat 'band-aid' measures.

The majority of the climate change adaptation literature agrees that vulnerability and adaptive capacity is physical climate stimulus specific (this is reflected in the IPCC definition) and this is indeed true, to an extent. However, this emphasis may come at the expense of seeing the other half of the equation – the non-climate factors and processes that *drive* this stimulus-specific vulnerability. When this dominant approach translates into practical assessment approaches, such as those commonly employed in CBA, the focus appears to be mostly on 'coping strategies' or specific actions taken to deal with

specific impacts of a particular climate stress. This is obviously important and necessary, especially where a community is 'urgently' vulnerable and at extreme risk from climate stresses. However, addressing stimulus-specific coping strategies (both currently and in the future) is only half the equation in terms of adaptation to climate change. In the context of disasters, Allen (2003:170) contends that "disasters can only be fully understood and addressed through the consideration of everyday livelihoods and underlying vulnerability". This is perhaps even more pertinent in the context of CBA, given the need engender self reliance to deal with an increasingly uncertain climate. In the case studies examined this makes the most sense in local eyes.

Whether or not initiatives to address this 'resilience' aspect of adaptive capacity should - or can - actually be called *adaptation* is contentious and, being largely a product of debates in international discourse, beyond the scope of this paper. Schipper (2007) contends that there are "numerous factors determining vulnerability that cannot explicitly be affected by adaptation", in the way that 'adaptation' is currently defined and framed in discourse sustained by policy negotiations under the UNFCCC and by the IPCC. Within these frameworks activities qualifying as 'adaptation to climate change' remain concentrated on addressing issues directly related to specific climate stress, despite the rise of a 'vulnerability-led' approach to adaptation over the past decade. It is therefore difficult to prove adaptation 'additionality' in an initiative indirectly related to climate, despite its possible merit in generating adaptive capacity. This is perhaps a partial product of the disciplinary roots of, and dominant epistemological perspectives in international climate change institutions such as the UNFCCC and the IPCC. Regardless of the reasons, it is suggested here that this works at the expense of ameliorating the underlying condition of vulnerability at the community (and indeed any) scale. As local perspectives reflect, underlying vulnerability is equally as important as climate stress specific vulnerability.

In Vanuatu, processes of social change underlie much of vulnerability to climate, creating heightened 'everyday' vulnerability, which eventually translates into heightened 'event-centered' vulnerability. 'Social change' in itself is in many ways inevitable and should not necessarily be viewed negatively. However, the ways in which communities are able to adjust to *social change* has important implications for the ways in which they are able to deal with *climate change*, given that social change appears to alter the nature of resilience. As has been recognised by many, most of the issues at the true root of vulnerability are outside the direct sphere of influence of the community itself, and therefore unable to be addressed by community-scale initiatives (van Aalst et. al., 2008). Chief MurMur of Mangaliliu village (Efate) aptly believed many problems and changes in the community to stem from "*fosis blong global*" ("global forces") and particular consequences of exposure to these in the village context. This point further highlights the importance of building general resilience to improve the ability of a community to adapt to both social and climate changes, as the two are not mutually exclusive. Adaptation therefore appears to require processes to address social and cultural issues as well as climatic ones, enabling communities to deal better with environmental uncertainty *in a way that suits them*, without losing the value systems and practices that underpin their

way of life. In short, adaptation should be about adjusting to both climate and social change.

7 CONCLUSION

Based on insights from the field, this paper argues that CBA – and the assessment processes involved – would benefit from greater emphasis on the 'non-climate' factors influencing vulnerability and maintaining resilience. It is suggested that although most approaches to CBA pay lip service to these, in reality assessments and outcomes remain too concentrated on aspects of vulnerability *directly* related to climate stress and climate change, while it is often the state of 'everyday life' that makes this necessary in the first place. The paper concludes that given the nature of vulnerability and resilience (in the context of climate change) at the community scale in rural Vanuatu, CBA to climate change requires a holistic approach, practically addressing both climate and non-climate aspects of vulnerability. 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. Building a foundation of resilience is integral to adaptive capacity. The success and sustainability of 'adaptations' aimed at increasing the ability of a community to self sufficiently cope with climate stresses is likely to depend on this foundation - as these case studies demonstrate. Sustainable adaptation at the community scale is likely to require finding creative ways to address local concerns and priorities whilst increasing adaptive capacity. Addressing merely direct climate-related aspects of vulnerability for adaptation to climate change is likely to put the 'cart before the horse' in many community contexts.

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