

Climate Change and Human Security in the Pacific Islands: The potential for and limits to adaptation

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Introduction

This chapter outlines some of the links between human security and climate change in the Pacific Islands. It demonstrates that climate change poses significant risks to human security in the region. The links between climate change, human security, and instability and conflict are also explored. It seems unlikely that climate change will be the principal cause of violent conflict in the region in the future, but it may increase the risk of violent conflict in some places. The chapter argues that in order to increase human security in the region and avoid possible conflict and instability, climate-change adaptation strategies must be implemented.

Climate change in the Pacific

Four large-scale changes in climate are expected in the Pacific Islands region. First, air temperature in the Southern Pacific is projected to increase 0.99°C–3.11°C by 2099 relative to 1961–1990 temperatures (Ruosteenoja et al, 2003). Even these predicted increases in temperature may be conservative given that there have been decadal increases in the region of 0.3°C–0.5°C since the 1970s (Salinger, 2001). It is also expected that there will be sea-surface temperature increases. Evidence suggests that tropical sea-surface temperatures have been rising over the past 50 years, and this has severe implications for coral ecosystems (Reaser et al, 2000).

Second, changes in precipitation are expected. Rainfall events will be more intense and possibly less frequent, with implications for flooding and drought events (Jones et al, 1999). In summer, the wet period in the region, more rainfall is expected, whilst there may be less rainfall in the already dry months. This will have implications for sustaining crops throughout the year, given that agriculture is almost entirely rain fed, rather than irrigated (Lal, 2004).

Third, it is expected that climate change will lead to increases in sea level. By 2100, the sea level may rise 18 cm–59 cm (IPCC, 2007e). However, a significant amount of uncertainty remains about projected sea-level rises and there is reason to believe these estimates may be conservative (Rahmstorf, 2007).

Fourth, it is likely regional climate systems and extreme events will change. Of particular importance to the regional climate system (and consequently, development) is the El Niño Southern Oscillation. El Niño years bring drought to most of the Pacific Islands. Currently, the effect of climate change on the frequency of El Niño events is uncertain, but since the 1970s El Niño events have been more frequent and intense (Brazdil et al, 2002, pp 41–42). As mentioned previously, there may be increasingly intense drought and flooding events in the region. Also, tropical cyclones may become more intense in the future (Walsh, 2004).

Implications for human security

Human security is the state where individuals and communities have the options necessary to end, mitigate, or adapt to threats to their human, environmental, and social rights; have the capacity and freedom to exercise these options; and can actively participate in pursuing these options (O'Brien et al, 2008). Climate change will increase human insecurity in the Pacific Islands. It will increase people's exposure to: environmental risks such as more intense floods, droughts, and storms; decreased productivity of crops and fisheries; saline contamination of freshwater; and a temporal and spatial spread of mosquito-borne diseases such as malaria and dengue fever (Singh et al, 2001; Barnett and Adger, 2003; Barnett, 2005).

However, it is not only climate and other environmental processes that determine the level of human insecurity from climate change. The properties of a social system in which people live also determine their susceptibility to damage from climate risks. In Fiji, for example, smallholder farmers are more susceptible to damages from climate changes than are urban workers employed by the state. The farmers have land tenure insecurity, are growing sugar that is receiving declining prices, and their livelihoods suffer during a drought (Lal and Rita, 2005; Prasad, 2006; Mahadevan, 2008). The incomes of urban workers are far less sensitive to changes in climate. The properties of a social system also determine the capacity of actors to implement adaptation actions. For example, the smallholder farming households in Fiji that have multiple income streams are more able to sustain their income when crops fail and sugar prices fall than are farmers who are solely dependent on selling sugar. These examples reinforce the findings of many studies of social vulnerability, which is that the most climate-insecure populations are those who are highly exposed to biophysical risk, are sensitive to those risks and have little capacity to manage and recover from them. The following two examples reinforce that it is not climate change per se but also the nature of social and economic systems that create climate insecurity.

In the upland areas of Timor-Leste people are extremely dependent on household production of maize for their food security. Soils are thin and maize is not irrigated, so productivity is low and falls lower in times of drought. When droughts occur, many households have insufficient income to buy food, and many of these cannot borrow money, cannot find alternative work, and may not receive emergency relief assistance. Consequently, many farming households eat only one meal per day for extended periods and malnutrition (including child malnutrition) increases and morbidity and mortality increase (Barnett et al, 2007). The period of occupation by the Indonesian armed forces (1974–1999) is the most powerful cause of the food security problem in Timor-Leste. Several elements of the occupation period have led to food insecurity. During this time, education was used as a propaganda tool rather than to empower, thereby restricting the acquisition of knowledge and skills and

subsequently restricting income. Capital was also diverted to military-related purposes, which has led to a stock of economic and social infrastructure that is vastly insufficient to facilitate rural development. Finally, there were wholesale changes in the system of land tenure and so uncertainty about property rights constrains investment and lending (Barnett et al, 2007). The combined effects of these changes have arrested development to the extent that upland farmers in Timor-Leste are the poorest people in one of the world's poorest nations, and are highly insecure from climate change.

In Funafuti, Tuvalu, most people are highly vulnerable to climate change due to the ecological characteristics of the atoll. Furthermore, some important social characteristics limit adaptive capacity, including high population density and limited economic and human capital (Government of Tuvalu, 2007). In the next 5–10 years, climate change may undermine the basic needs of people in Funafuti, including the need for an adequate supply of clean water and nutritional needs (Government of Tuvalu, 2007). Yet, within Funafuti insecurity is not evenly distributed – some people are far more at risk of damage to their houses from storms; illness due to water-borne diseases; and under-nutrition due to rising food prices and shortages of fish. This inequality is a function of very high levels of underemployment; there is income poverty amongst the two-thirds of the workforce not employed by the public sector. It is also partly a function of the land tenure system in Funafuti. Most land is *kaitasi* (extended family-owned) land yet less than a quarter of the population of Funafuti was born in Funafuti. Inter-marriage between people from different islands, out-migration of Funafutians to New Zealand and Australia, and a relaxed approach to property rights enable most migrants from the outer islands some access to land in Funafuti (Isala, 1994). Still, for various reasons, about 7% of households are living in impermanent shelters on the edge of the most polluted parts of the island without access to a toilet or water on the premises. It is this small group that is most insecure in the face of climate change and have the fewest resources to draw on to avoid or adapt to climate change.

Climate-induced human security as a potential driver of conflict

If we accept that climate change poses risks to human security, as outlined above, then we must also question whether there are links between human insecurity, climate change, and violent conflict. The following section outlines a theory of human insecurity and conflict. It is informed by evidence from various case studies summarised in Barnett and Adger (2007), but could be applied profitably to the Pacific region.

A vast body of research investigating the relationship between violent conflict and environmental change demonstrates three clear findings. First, environmental change does not and is highly unlikely to ever cause war between countries. Secondly, environmental change is never the sole or principal cause of violent conflict. Thirdly, environmental change may exacerbate the risk of violent conflict under certain circumstances and this is most likely to occur in low-income countries with governance problems (Barnett, 2003; Khagram and Ali, 2006).

In light of these findings, climate change may increase the risk of violent conflict in two possible ways. First, climate change may exacerbate the processes whereby sudden poverty leads to a growth in recruitment to armed groups. Climate change can increase sudden and chronic poverty in societies where people are dependent on natural resources for their livelihoods. Conflict risk increases primarily as a function of the way in which people respond to greater susceptibility to poverty (Ohlsson, 2000; Barnett and Adger, 2007). If, for example, young males join informal gangs, the risk of violent, criminal, and militia activity increases. As livelihood security seems to be an important factor in security from violence, welfare systems and/or aid directed towards smoothing out variability in access to basic needs and income can, therefore, go a long way towards maintaining peace (Gough, 2002).

Second, climate change may decrease the capacity of the state to avert violent conflict. State functions that are of particular importance in militating against the generation of violent conflict include the provision

of health care and education, the protection of human rights, the establishment and maintenance of a strong and independent judiciary, accountable and transparent police services and armed forces, and the protection of democratic processes. When these functions are extensive and effective, states are legitimate, people have opportunities to develop and have less anxiety about the future, conflict resolution mechanisms tend to be effective, and economies tend to grow and poverty levels tend to fall (Barnett and Adger, 2007). On the other hand, when states contract and the freedoms, opportunities, and services they provide subsequently contract (as may occur as a consequence of structural adjustment and good governance programmes, for example), violent conflict seems to be more likely (Chossudovsky, 1998; Gough, 2002). Climate change may weaken states by increasing the costs of providing public infrastructure and by decreasing government revenue (for example, through reduced rents on resources such as fisheries or declining tax revenues collected from the wages of people employed in primary sector activities) (Barnett and Adger, 2007).

In order to apply this hypothesis to the South Pacific region, two factors must be considered. First, it must be asked whether livelihood shocks increase recruitment into gangs and militia. It remains to be seen whether this is the case in regional hotspots such as Honiara, Port Moresby, and Suva. Second, evidence of climate perturbations leading to declining state capacity and therefore an increased risk of violent conflict must be examined. Evidence supports the hypothesis that external shocks caused declining state capacity in the Solomon Islands. For example, the Asian crisis caused a 75% reduction in the price paid for exported logs, causing export revenue to fall by approximately 50%. Simultaneously, the balance of payments deteriorated, government revenue declined by 20%, and there was an overall contraction in gross domestic product of 1% in 1997 and 13% in 1998 (Fairbairn, 1999). In response, the government devalued the currency by 20%, cut expenditure, and froze government wages. This, in turn, led to increasing unemployment and inflation (Fairbairn, 1999). In 1997–98, there was also a major El Niño event, causing widespread drought throughout the Solomon Islands. However, whether these events

contributed to the skirmishes between the Isatabu Freedom Movement (Guadalcanal) and Malatian settlers that began in mid-1998 remains to be tested.

Adaptation to avoid human insecurity

Thus far, two primary arguments have been advanced. First, climate change is going to increase human insecurity in the Pacific Islands. Second, climate change may slightly exacerbate the risk of violent conflict. Either of these concerns justifies some concerted response to avoid climate insecurity. There are two sets of possible responses: big cuts in greenhouse-gas emissions and adaptation to avoid or adjust to actual or expected changes in climate.

Adaptation means adjustments to reduce vulnerability to observed and expected changes in climate. Improving adaptation would require one or more of three things: reducing the sensitivity of the system exposed to climate change (for example, building irrigation systems in areas where rain-fed agriculture may be less tenable due to increasing variability); altering the exposure of a system or group to climate change (for example, by relocating communities living in flood-prone areas); and increasing adaptive capacity (for example, subsidising disaster insurance to households that cannot afford it) (Adger et al, 2005).

Research on adaptation has demonstrated one important lesson: adaptation activities have to be consistent with what people consider to be their needs and rights and values (Barnett, 2008). To give one example, it is widely understood in Australia that the best solution to climate change in Tuvalu is to relocate the whole population (Farbotko, 2005). This assumes that relocation is necessary, that the people in Tuvalu want to be relocated, and only a reasonably small financial cost is involved. However, relocation is by no means necessary. There is broad scope for adaptation to succeed, particularly if there are deep cuts in emissions of greenhouse gases. Even in a worst-case scenario the impacts will differ across the nine islands of Tuvalu and forced migration will not be a uniformly applicable response (in space and time and across the whole population). Research shows that people in Tuvalu

do not want to migrate and are deeply attached to their islands and the cultures and communities they sustain (Mortreux and Barnett, 2009). Further, the social costs of forced migration will be huge, and the history of forced migration is rarely a happy one.

It is, therefore, important that adaptation strategies are not imposed by outsiders. Decision-making about adaptation is one very important barrier to adaptation. If the decision does not suit local needs and values and if it is not legitimate, implementation of adaptation will fail. Having said this, engaging communities in decision-making processes is not straightforward. In this sense, adaptation is very much like 'development'. Both adaptation and development mean different things to different people, there are value conflicts and trade-offs to be negotiated, and there are information asymmetries, gatekeepers, and rent seekers in all levels of decision-making.

It is important to distinguish between adaptation and adaptive capacity. Adaptation is an action or actions; adaptive capacity is the ability to implement those actions. Adaptive capacity is the set of resources needed to adapt and the ability to use those resources to minimise or avoid vulnerability. These resources include capital, information, skills, and technology, and they are unequally distributed.

Effort needs to be directed more towards adaptive capacity than discrete adaptation actions. There are two reasons for this. First, a community that has high adaptive capacity is in the best position to negotiate and implement solutions that are suitable and sustainable. Second, uncertainty about impacts (magnitude, timing, and location), and about the likely effectiveness of an adaptation response, means the potential for regret is high (Barnett, 2001). As a consequence, investing in the capacities of communities to adapt is a sensible and no-regrets response to climate-change risk.

The potential for adaptation to avoid climate insecurity may be large, depending on the nature of the risk to be avoided, the degree to which concentrations of greenhouse gases can be reduced, and the extent to which adaptive capacities can be expanded. The two examples

from Timor-Leste and Tuvalu illustrate potential for adaptation despite significant challenges to human security.

The food security of households in the highland in Timor-Leste can be improved in the short term by improving access to electricity and roads, introducing small-scale irrigation systems, improving seasonal climate forecasting, introducing agricultural extension services, and, if need be, introducing income substitution schemes (for example, work on capital projects in the hungry season). In the longer term, food security can be improved by a stable land tenure system, growth in off-farm employment in rural areas, improved banking services to facilitate remittance receipts, universal primary education, and universal primary health care. Indeed, in 20 years' time the effect of these changes may well outweigh the effects of climate change, so that food security in the highlands of Timor-Leste considerably improves despite climate change.

In Funafuti, the health and housing of the poorest 10% can be greatly improved by the government leasing land for migrants to settle on and providing basic services such as water, electricity, and sewerage. Health and housing can also be much improved by providing more-frequent and less-expensive internal transport between islands, a distance education system so that early secondary education can be achieved in the outer islands, and improved health care in the outer islands (all of which would reduce the pressure for people on these islands to move to Funafuti). A seasonal migration scheme to New Zealand and Australia and an increased quota of permanent migrants to New Zealand and Australia could also increase human security in Funafuti. However, with increased migration must come improved banking systems to facilitate the movement of remittances and citizenship for permanent migrants so that they can freely move between Tuvalu and New Zealand and Australia.

The suggestions mentioned here for both Tuvalu and Timor-Leste form a preliminary assessment only. More work needs to be done to develop and elaborate the requirements for human security in these two instances. However, the above suggestions demonstrate that no-regrets responses are possible. Many of these responses would require

institutional changes and some would require money. All of the above suggestions would reduce vulnerability and increase adaptive capacity. They also suggest that much can be done to reduce people's insecurity in the face of climate change, particularly as many of these changes are of a commonsense, no-regrets nature, and are not overly expensive.

Limits to adaptation

If the preceding discussion seems overly optimistic, that is because it somewhat ignores recent evidence about likely future greenhouse-gas concentrations. Evidence suggests that atmospheric concentrations of 650 parts per million by volume of carbon dioxide equivalent are likely given current trajectories, which implies mean global warming of 4°C or higher, with serious implications in terms of impacts on the Pacific Islands beyond 2050 (Anderson and Bows, 2008). To put this into perspective, a 2°C rise in mean local temperature above pre-industrial levels will make coral bleaching an annual event in most regions of the world, with most reefs never recovering (Donner et al, 2005). Therefore, a 2°C rise in local temperature is highly likely to result in degradation of coral systems such that life on coral-dependent islands such as atolls will be seriously undermined. This implies that to give communities in the Pacific the best chance to adapt to climate change and sustain current levels of human security, deep cuts in greenhouse-gas emissions are required. In Australia, for example, cuts in the order of 90% below 1990 levels by 2050 are necessary. These cuts will not avoid climate change as existing concentrations of gases mean some degree of change is now unavoidable, but they are required to avoid warming of beyond 2°C. Even so, the climate will change, therefore efforts to build communities' adaptive capacities is also critical.

If mean global temperature rises more than 2°C, there will be many limits to what adaptation can achieve. Consider for example the effects of a 3°C rise in temperature on people living on atolls such as in Tuvalu. In a world of unlimited resources and boundless technological improvement it may be possible to secure water resources, import all foods, and continually build up atoll islands using artificial materials.

However, these responses are unlikely to materialise due to financial barriers. Even if there were the means, the outcomes of these responses might be better termed an 'impact' of climate change rather than an 'adaptation'. That is to say, Tuvaluans would become mendicant, their rights to a means of subsistence would be lost, and their unique material and social cultures would be eroded. Thus, even if all the barriers to adaptation could be overcome, unless we can achieve deep cuts in emissions there will still be limits to what adaptation can achieve: things will be lost, and human security will be undermined.

Conclusions

It is very likely that climate change will increase human insecurity in many places in the Pacific Islands. If rates of change are significant and efforts at adaptation are meagre, we can expect widespread and significant declines in human security on a scale that, in conjunction with weakened states, may increase the risk of violent conflict. To avoid this, every government in the region, donors, and non-government organisations must work with local communities and key sectors to improve the capacity of actors to adapt. A systematic and extensive programme of work is needed and it needs to learn from the past and harness the brightest people with the highest of ideals across the region. Deep cuts in emissions of greenhouse gases are also clearly needed. If New Zealand and Australia have a commitment to the Pacific Island countries then they also have a commitment to show leadership to the region and the world by accepting deep cuts in their own emissions of greenhouse gases. With these two things climate security is possible, but without them climate insecurity seems inevitable.

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