Three linked risks for development in the Pacific Islands: Climate Change, Natural Disasters and Conflict

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ABSTRACT

Pacific Island countries are demonstrably vulnerable to the risks of climate change, disasters and conflict. This paper outlines the conceptual links between these risks, briefly describes how each of the risks operates in the Pacific Islands, and goes on to demonstrate the interaction of climate change, disasters and potential for conflict in the Pacific Islands, by applying a new conceptual framework to some illustrative case studies.

The case studies include relocation after the Gizo earthquake, ‘environmental refugees’ from sea level rise, aggravation of the social issues of urbanisation and unemployed youth by climate change, and impacts of climate change on fisheries and thus on food security. Fortunately, none of these cases has yet crossed the threshold into violent conflict, even though relocation of an affected community onto someone else’s land is a particularly sensitive issue in the Pacific Islands.

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1. INTRODUCTION

It is no longer possible for anyone to ignore the powerful and destructive effects of climate change and natural disasters. Policy makers, scientists, and development workers around the world are becoming increasingly aware of the implications of poor disaster management and response planning. That disasters often demolish development gains is now a globally accepted idea. Increasingly however, discussions have shifted to the effects of climate change and disasters not just on development gains but also on security – both state and human (e.g. Brauch et al., 2009). Climate change, natural disasters and conflict are all risks that threaten to impede social and economic development.

To date in Pacific Island countries (PICs) these three risks have largely been seen and managed as separate issues, with each PIC giving different emphasis to each risk, depending on its circumstances and history. Thus, in the atoll state of Kiribati, climate change and sea level rise is seen as the key issue for national survival and receives high political attention. Solomon Islands, on the other hand, lies on the geothermal ‘ring of fire’ and is prone to a wide range of natural disasters of which climate change is only one. It is also still recovering from a violent period of civil unrest (1998-2002), which ended only with a peacekeeping intervention by its regional neighbours (RAMSI). In Papua New Guinea, there are even greater concerns about conflict and human security. In Port Moresby (the capital of PNG) 50% of households have experienced some form of armed violence in the past 6 months (Small Arms Survey, 2005).

As the world begins to recognize the risks posed by climate change and natural disasters on both state and human security, more and more attention at the international level is being placed on the interface between the consequences of climate change and natural disasters, and the issue of security, including the potential for violent conflict.

The interactions between climate change, natural disasters and the potential for conflict

It is the interface of the three that is of greatest interest. Although this paper focuses on the “triggering” relationship between climate change, natural disasters and security, Figure 1 illustrates that there are clear two-way links between all 3 corners of the triangle.

In brief, climate change will make some natural disasters worse, notably cyclones. Other natural disasters, notably large volcanic eruptions, by putting large amounts of greenhouse gases and aerosol particles into the atmosphere can dramatically affect the climate globally in both the short and long term. (For example, witness the “years without a summer” following the eruptions of Mt Pinatubo in 1991 and Krakatoa in 1883) Major natural disasters of all kinds force people to relocate away from the

* Note: Figures, Tables and Notes are collected at the end of this paper
affected area, for either a short time or for the long term. Large-scale migrations throughout history have often involved conflict between the migrants and those to whose land they go. Conversely, conflict, especially civil war, can make it very difficult to mobilise recovery from a natural disaster, as government falls apart and/or bars outside access to the affected region. Conflict can also contribute to human-induced climate change through increased greenhouse gas emissions from burning fuel supplies or destroying forests. In the other direction, the more gradual but equally insidious impacts of climate change such as sea level rise, coastal erosion and [in other places] long-term drought will also force relocation of millions of people, which again heightens the potential for conflict.

Structure of this paper

In the next section, we briefly review some relevant international literature, much of which deals with only side of the triangle of Figure 1. Section 3 examines how the three risks of climate change, natural disasters and conflict separately affect the Pacific Islands. Section 4 introduces a new conceptual framework for examining how climate change and the associated natural disasters can lead to conflict, and applies the framework to several case studies in the Pacific Islands. The key conclusion of the final section is that none of these cases has yet crossed the threshold into violent conflict, even though relocation of an affected community onto someone else’s land is a particularly sensitive issue in the Pacific Islands.

2. INTERNATIONAL DISCUSSIONS

Although the conceptual link between disaster risk reduction and climate change adaptation is now widely recognised, the vocabulary and practitioners, and responsible institutions are often still separate (Schipper, 2009).

The Government of the UK led a discussion in the UN Security Council in 2007, linking climate change to international security. Then Foreign Secretary Margaret Beckett pointed to three significant consequences of climate change bearing on international security (Reuters, 2007):

- Unprecedented levels of migration – especially from poor to rich countries - as a result of flooding, disease and famine
- Intensified competition for food, water and energy
- Large-scale global economic disruption.

Similarly some within the European Commission have argued that climate change needs to be addressed as part of a “preventive security policy” (European Commission (High Representative), 2008) The EC paper looks beyond Europe, to elaborate the significant threat to poor countries and to point to rifts not just between rich and poor countries, but also in conflicts between developing countries such as between India and China. [1] The paper also goes further and presents geographical examples of potential effects on security of climate change on hot-spot regions such as Africa and the Middle East. More graphic presentations of such scenarios for major conflicts
arising from the impacts of climate change on the Indian subcontinent, China, and Central America are given by Dyer (2008). A report by Smith and Vivekanda (2007) for International Alert (an independent peace-building organization with field offices across the developing world) looked at social and human consequences of climate change, specifically exploring the risks of conflict and instability. That paper highlights four key elements of risk: political instability, economic weakness, food insecurity, and large scale migration. Similarly UNDP Bureau of Crisis Prevention and Recovery is currently seeking to develop a greater understanding of the interactions between natural disasters and conflict.

In those rich countries (such as USA and Australia) where security concerns have focused on the ‘war on terror’, some security experts have identified climate change as a factor that could underlie conditions (such as the desperation of farmers deprived of land or water) which may lead people to support terrorist groups (e.g. Soderblom, 2008).

The Fourth Assessment Report released by the Inter-Governmental Panel on Climate Change offers the most definitive assessment to date on the causes, trends and projected impacts of climate change. The report indicates that climate change cannot easily be disentangled from other factors which erode development gains and cause upheaval among human populations: “Vulnerable regions face multiple stresses that affect their exposure and sensitivity as well as their capacity to adapt, these stresses arise from, for example, current climate hazards, poverty and unequal access to resources, food insecurity, trends in economic globalization, conflict and incidence of diseases.” (IPCC, 2007a p.19)

There have been very few previous studies that explicitly examine the linkages of all three sides of the triangle: climate change, natural disasters and conflict. The only one known to us is the Global Environment Change and Human Security Project report for the Norwegian Government, which focuses on the implications for developing countries. This report contains a huge bibliography of academic papers, books and agency reports bearing on each side individually of the triangle shown in Figure 1. It concludes “the evidence about the links between environmental change and violent conflict is currently inconclusive…There is, however, ample evidence that human insecurities associated with a lack of basic needs such as food, water, and shelter, limit capabilities and freedoms, and thus have negative implications for human development.” (O’Brien et al., 2008)

The Small Island Developing States of the Pacific region, with support from Canada, Maldives and Philippines, sponsored a resolution adopted by the United Nations General Assembly in 2009 that calls attention to the threat of climate change to international peace and security (UNGA, 2009). The resolution is driven by concerns of Pacific Island countries and other small island developing states (SIDS) that too many industrialised states are not taking climate change seriously enough to prevent drastic impacts on the islands. Therefore the resolution seeks to put climate change into an agenda that developed countries – even the recalcitrant USA – take seriously, namely international peace and security.
3. THREE SEPARATE RISKS TO DEVELOPMENT IN THE PACIFIC ISLANDS

Climate change, natural disasters and conflict are all risks that threaten to impede social and economic development. To date, in Pacific Island countries (PICs) these three risks have largely been seen and managed as separate issues, with each PIC giving different emphasis to each risk, depending on its circumstances and history. Therefore we summarise here the current status of each of these issues before examining the linkages between them.

The map in Figure 2 indicates locations. Note that the PICs are all small in land area and population (except for Papua New Guinea, PNG), though all have an extensive marine Exclusive Economic Zone; in most cases the label on the map is far bigger than the island(s) to which it refers! PNG has a land area of 462,000 km² and a population of nearly 6 million. Each of the others has population of less than 1 million and land area of less than 19,000 km². Kiribati, for example, has a land area of only 810 km² though it spans some 2000 km of ocean! All except the French territories of New Caledonia and French Polynesia are classified by the UN as developing countries.

Conflict

Large scale protracted violent conflict in the Pacific Islands, unlike in some other regions, is mercifully rare. However, in recent decades some Pacific Island countries have experienced a variety of localised conflict including civil war, tribal conflict, inter-communal violence, political instability, social unrest and in some instances a deterioration of law and order. Examples of conflict in the region include: civil war predominantly in the Bougainville region of Papua New Guinea; tribal conflict in the Highlands of Papua New Guinea; inter-communal violence in Solomon Islands; political instability in Fiji including the perpetration of military and civilian coups; social unrest in Tonga and Vanuatu; and in some instances general deterioration in law and order.

A good starting point into the extensive literature on conflict in the Pacific is the website of the State Society and Governance Project at the Australian National University, available through www.anu.edu.au. See especially the paper by Spence and Wielders (2006).

The damage and loss of lives during these conflicts seem small by global standards but have a tremendous impact on the stability and development of these small islands, which is highlighted by the estimates that 10% of the population were killed during the Bougainville Crisis and a further 60,000 people displaced. In Solomon Islands the conflict resulted in over 300 people losing their lives and some 50,000 people displaced resulting from threats, abductions and destruction of property.

Conflict and threats to stability in the Pacific, as in other regions, is rarely caused by a single factor. There are usually long standing underlying causes of conflict, or threats to stability which remain embedded in society which erupt into violence due to certain
triggering factors (such as natural disasters or elections, for example). However events can act as a trigger for conflict, only if there are sufficient threats to stability that interact with one another to create a high level on instability and division in the society. Unless these underlying threats to stability are addressed in the long term, the country may be at risk of violent expressions of conflict on an ongoing basis, at the onset of new and ongoing trigger events.

Analysis by UNDP and the Pacific Island Forum Secretariat (as yet unpublished) has identified some underlying causes and accelerating factors of conflict that are common across the region and present an increasing threat to stability if not addressed. These are:

- Economic inequality
- Land issues
- Weak governance capacity
- Unemployment and alienated youth
- Migration
- Urbanization
- Inter-group tensions

It is important to recognise that several of these factors are interrelated. For example, perceptions of economic inequality drive urbanisation, which may lead to unemployed youth if the hoped-for economic opportunities are not forthcoming.

Many of the states that have avoided violent conflict in recent times are in Polynesia, where the traditional governance systems are still operating in parallel with or underlying the modern governance systems and operate up to a national level, thus providing a mechanism for intra-state dispute resolution. Also these states have much tighter gun controls than has been the case in Papua New Guinea and Solomon Islands.

International research shows that most large-scale violent conflict is triggered by specific events. Such triggers are often linked to the manipulation of ‘identity’ by so-called ‘conflict entrepreneurs’ who benefit from instability. (The Fiji coups are a good example of this.) As Ratuva (2002) puts it, ‘differences in identity [e.g. in terms of ethnicity] do not necessarily cause political conflict, but the way in which these differences are deployed to justify particular demands and interests may do so.’

**Natural disasters**

Pacific Island Countries are amongst the most vulnerable countries in the world to natural disasters, in part because their economies and small communities are highly dependent on natural resources. The World Bank reports that since 1950 disasters have affected more than 3.4 million people in total and caused more than 1,700 fatalities in the Pacific region. (Bettencourt et al., 2006) This represents a significant fraction of the region’s population of less than 8 million; over 40 percent of the population of Tonga and Samoa is affected during a typical disaster year. (For comparison, OCHA (2009) estimate that over 20 million people out of a global
population of over 6 billion were displaced in 2008 by sudden-onset climate-related disasters.) Bettencourt et al (2006) estimated the economic cost of reported natural disasters in the Pacific Islands region in the 1990s at US$2.8 billion (2004 value). This represents a very significant fraction of the GDP of these small island states. For example, during disaster years, the economic losses have averaged 46 percent of GDP in Samoa, 30% in Vanuatu and 14% in Tonga. As the damage effects normally extend beyond the year of the disaster, so too do the consequent economic losses, which amount to 2–7 percent of GDP, averaged over both disaster and non-disaster years.

The most prevalent natural disasters in the region as a whole are cyclones, droughts and tsunamis, but not all PI countries are equally vulnerable to these hazards.

There has been a substantial increase in the number of reported natural disasters in the region since the 1950s, with a growing human impact per event. While this may be due to improved reporting, higher populations and increasing environmental degradation, there is no doubt that disasters in the region are becoming more intense and probably more frequent. Ten of the 15 most extreme events reported over the past half a century occurred in the last 15 years.

Much work has been undertaken in terms of disaster management and risk reduction at both national and regional levels. Nevertheless, the World Bank considers that the vulnerability of PICs is still exacerbated by socio-political factors including: risk management not adequately mainstreamed into national planning and budgetary processes; limited capacity within government and civil society; lack of awareness on the link between development practice and vulnerability disasters; weak institutional frameworks for implementing measures for Disaster Risk Management . Similar socio-political considerations apply to the vulnerability to climate change and to adaptation to that risk.

**Impacts of climate change**

High exposure to climate risks and limited adaptive capacity make Pacific Island Countries particularly vulnerable to climate change and sea-level rise. The impacts projected by the authoritative Intergovernmental Panel on Climate Change (IPCC, 2007a p.15) include:

- Deterioration in coastal conditions, for example through erosion of beaches and coral bleaching, is expected to affect local resources, e.g., fisheries, and reduce the value of these destinations for tourism.
- Sea-level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, settlements and facilities that support the livelihood of island communities.
- Climate change is projected by the mid-century to reduce water resources in many small islands, e.g., in the Caribbean and Pacific, to the point where they become insufficient to meet demand during low rainfall periods.

The impacts of sea level rise are already apparent in the low-lying atolls, which comprise most of Kiribati, Tuvalu and Marshall Islands, with many islands now being inundated almost annually by the highest tide of the year, particularly if it is coupled with waves from a storm surge. With sea levels projected to rise by at least 100cm by 2100, the very survival of these countries is threatened (see Box 2).
In relation to climatology in the Pacific Islands, (IPCC, 2007b p.72-4) say:

“In most models, the central and eastern equatorial Pacific sea surface temperatures warm more than those in the western equatorial Pacific, with a corresponding mean eastward shift in precipitation.”

This implies lower rainfall, more frequent droughts, and less frequent cyclones west of Fiji, with higher rainfall and more frequent cyclones east of Fiji. More generally about cyclones world-wide, IPCC project increased peak wind intensities and increased mean and peak precipitation intensities in future tropical cyclones, with the possibility of a decrease in the number of relatively weak hurricanes, and increased numbers of intense hurricanes (also known as typhoons or tropical cyclones).

Regional discussions about the socio-political ramifications of climate change are beginning to emerge. Such issues include forced migration, displacement and dislocation resulting from climate change and disasters and the subsequent ramifications on social structures and coping capacities. Although little documentation on these specific relationships is yet published, a useful step was the workshop on “climate change and migration” hosted by the University of the South Pacific in May 2009, co-sponsored by UNESCO and the Asia-Pacific Migration Research Association.

4. INTERACTIONS BETWEEN CLIMATE CHANGE, DISASTERS AND CONFLICT IN THE PACIFIC

A conceptual framework linking climate change and natural disasters to potential for conflict

Some building blocks of this framework have been set out in Part 3 of this paper:

- Potential for conflict occurs in a Pacific Island country when one or more of the following human security factors are present: economic inequalities; land issues; weak governance capacity; unemployed and alienated youth; migration/urbanisation; and inter-group tensions.
- Conflict requires a triggering event.
- Climate change is expected to increase the severity of such natural disasters in the region, especially tropical cyclones, which are the most widespread disaster events in the region.

To these we now add the following linkages:
- A sudden-onset natural disaster can be a triggering event for conflict.
- Longer-term (slow-onset) climate change can also trigger conflict by aggravating existing environmental and societal stresses, notably those on water supply and food security.

These linkages are indicated in Figure 3. In each case, a natural disaster or manifestation of climate change triggers a ‘physical’ consequence, which in turn aggravates one or more of the human security factors which underpin conflict in the
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Pacific. If this human security factor is already near its breaking point, then the trigger of the disaster or climate change impact can be enough to take an already tense situation over the threshold into overt conflict.

In the following text we draw out these linkages more explicitly. ‘Boxes’ are used to give more detail on some of the case studies. The physical consequence most likely to lead to conflict in the Pacific is relocation of people with consequent tension over land. *Table 1* illustrates how other human security factors can also be aggravated by natural disasters and climate change.

**Examples of the linkages**

*Relocation after a natural disaster: on whose land?*

Disputes over land are one of the major causes of tension and conflict in the Pacific Islands (Crocombe, 2008, chapter 11). In most PICs, most of the land is still under customary land ownership, either communal or individual. (The communal land-owning group is typically a village or clan unit.) Land, which usually allows a reasonably healthy level of subsistence farming, constitutes not only the main economic asset for many people, but also a manifestation of the identity of the community to which they belong. Landowners often require considerable persuasion to allow ‘their’ land to be used for any other purpose. As a further complication, in many PICs, there are often disputes about exactly who are the landowners, especially if the land suddenly becomes valuable to outsiders, e.g. because mineral resources are found under it. Most of the alienated land (i.e. land held under western-style law) is around the urban centres, where it was acquired in colonial times by colonists and/or the government.

The top row of *Table 1* summarises how a natural disaster of some kind can impact on the human security factor of *land*: a common consequence of a disaster is that people have to be relocated away from the affected area for a short or long time (depending on the nature of the disaster). For example, following the 2007 earthquake and associated tsunami in the Solomon Islands people in the worst affected areas were relocated to ‘temporary’ settlements inshore. They have now been there for over 2 years, which gives rise to tensions with the people onto whose land they have been relocated. (Ironically, most of these displaced are descendants of people who were moved by the British colonial government from some atolls in what is now Kiribati, when those islands became uninhabitable due to salt intrusion in the 1950s.) The political mismanagement of the relief effort (and of funds donated for it) invokes another human security factor, likely to lead to conflict (though it has not done so in this case): *weak governance*. Moreover there are perceptions of *economic inequality* arising from the way in which some villages have been favoured by the relief effort – with new buildings stronger than those destroyed - while others have got nothing as yet.

This story contrasts with the aftermath of the most recent eruption of the volcano(s) around the town of Rabaul in Papua New Guinea which smothered most of the town in ash in 1994. Several thousand people have been permanently relocated to the nearby Gazelle Peninsula. The success of this relocation is partly due to the funds and special administration set up to deal with it, but also because of the recognition implicitly given to conflict avoidance by putting most of the resettlement on land that
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belongs to a Church, having been alienated a century or so ago. Thus no native landowners are in a position to seek compensation (by force or otherwise) for the intrusion.

The remaining entry in the second row of Table 1 refers to a village on the island of Savaii in Samoa that was buried by a lava flow in 1908. The whole village was relocated, with assistance from the Catholic Church, to an unoccupied site on the island of Upolu, and recently celebrated the centenary of this event. Two probable reasons why that story turned out happily (no conflict) are that (i) inter-group tensions were low in the homogeneous society of Samoa, and (ii) unoccupied land was easier to find in 1908 than it would be now that the population of the country is much higher.

Although the most common type of natural disaster in the Pacific is tropical cyclones, only rarely have these been severe enough to require relocation from the affected area. All Pacific societies had traditional coping mechanisms, usually involving holding back certain long-lasting foodstuffs until they were needed, i.e. the interval between when the usual crops were destroyed and when a fresh crop could be planted and come to fruition.

Environmental refugees from sea level rise

Climate change is projected to make tropical cyclones more severe, and perhaps also more frequent (IPCC, 2007b p.56). That dynamic is implied in the ‘sudden’ disaster linkage to conflict indicated by the left side of the triangle diagram (see Figure 1).

But climate change can also give rise to conflict through the gradual and insidious effects represented by the right side of the triangle diagram (Figure 1), notably through sea level rise. And through persistent changes to rainfall and temperature patterns (e.g. longer dry spells and warmer seas).

The 2007 report of the Intergovernmental Panel on Climate Change projects that sea level may rise by 1m by the end of this century, thereby swamping many coral atolls, in which the highest point is less than 2m above mean sea level. But an atoll will become uninhabitable long before it is totally submerged, because salt water incursion will pollute its fresh water supply, which is held underground, in a ‘lens’ floating on top of the sea level. Salt water incursion from below is aggravated by extra high tides (king tides) and storm surges, which bring in salt water from above as it washes over the land. This is already happening to many atolls in the Pacific, and is likely to happen by about 2040 for most of the others. The Cartaret Islands of PNG are one case, but their inhabitants have been able to move to higher ground elsewhere in PNG, albeit with some tensions over land use (see Box 1). But some PICs consist almost entirely of atolls, notably Kiribati, Tuvalu and Marshall Islands.

All or most of the tens of thousands of inhabitants of these countries will probably have to migrate to other countries either legally or illegally by about 2040. These raises not only the internal human security factors of Table 1 but also the international security concerns flagged in section 2 of this paper (See Box 2).

Box 1. The Carteret Islands: the first environmental refugees?
The Cartaret Islands are a group of low-lying coral atolls in Papua New Guinea, just to the east of the large island of Bougainville. The sea now washes over these islands to such an extent that they are rendered uninhabitable because of the effects of salt water intrusion. Indeed, parts of these islands are already permanently submerged under water. The few hundred people who used to live there started to move out as early as 1994 – to the ‘mainland’ of Bougainville.

Environmental NGOs such as Greenpeace have given much publicity to this case, not least through videos on YouTube, claiming that these people are the first ‘environmental refugees’ from human-induced sea level rise. Some geologists dispute this interpretation, saying that the islands are sinking due to geological instabilities. But in human terms the effect is the same: people have to move because of the sea swamping their homes on low-lying islands.

The move was facilitated to some extent by the Bougainville provincial government and the government of PNG. Because they initially moved to a land-locked location, the first people to move felt culturally adrift as their traditional marine skills were of little help in subsistence gardening of unfamiliar crops. Some of them actually drifted back to their own islands. But as the islands sunk further, there was no choice: they had to move, and all of them have now done so. As at Rabaul, they have dodged the resentment of traditional land-owners by moving onto church land (though it is not clear that the church invited them).

**Box 2: Can a whole country relocate? The case of Kiribati**

Kiribati is comprised of 33 inhabited islands, all but one of which are low-lying coral atolls. In a typical atoll, a lagoon of sea water is enclosed by a coral reef, some of which rises above sea level to form a strip of land less than 200 metres wide with a maximum height of about 2 metres (Nunn, 1994).

Because of salt water intrusion caused by sea level rise, Kiribati and other atoll countries may become largely uninhabitable by 2040 or thereabouts, as they will have no stock of fresh water to drink or to grow crops. In Kiribati this pressure will be particularly severe, because about 50,000 people (half the total population) now live in the ‘capital island’ of Tarawa, concentrated in the most habitable side of this ‘large’ atoll: a strip about 20 km long by 200 meters wide and no more than two meters high. Thus, on this island with little land available for crops and limited fresh water, food security and water supply are already under stress. Climate change and associated sea level rise will worsen these human security issues.

For such countries, sea level rise is a matter of national survival, and consequently an issue of high political importance. Thus, the President of Kiribati, Mr. Anote Tong, has been vocal in international forums, not least the Conference of Parties of the UN Framework Convention on Climate Change. He points out that the industrialised world (which is responsible for the greenhouse gas emissions which are causing sea level rise) consequently has a moral obligation to facilitate the relocation of the people who will be displaced from Kiribati and similar countries. He also seeks assistance to upgrade the skills of the people of Kiribati, so that they can better adapt to life in another country, even though much of their traditional culture will be lost (which can be seen as a related human rights issue) (Nadkarni, 2008).

**Climate change will aggravate issues of urbanisation and unemployed youth in the Pacific Islands**

The population of most Pacific Island countries is both very young (typically >50% under 15 years old) and rapidly increasing (e.g. 2% increase per year in Kiribati, 2.2% in PNG) (SPC, 2009). There is also increasing urbanisation, much of it now driven by perceptions of better educational and consequently better economic opportunities.
in the urban centre. Unfortunately, many of the young people who finish up in the towns of the Pacific are unable to find the hoped-for economic opportunities but are reluctant to ‘return’ to the rural area from which they or their family have come, as they feel that to do so would lower their status by an admission of failure. Instead they hang round the towns as a collective of unemployed or alienated youth. This is rated as a potential conflict factor because it can lead to crime as a means for the youth to support themselves, and criminal gangs as a way to assert their identity, as has already happened dramatically in Papua New Guinea.

Box 3 compares the youth situation in PNG, with that in Kiribati, where violent conflict is very much rarer. Solomon Islands and Fiji represent intermediate cases between these extremes.

Climate change is likely to aggravate these human security factors, by decreasing food security in the rural areas, thereby adding to the factors inducing migration to urban areas where imported food is more readily available. Locke’s (2009) interviews in Kiribati suggest that this is already happening there. Alternatively, where people (usually older people) are reluctant to move for cultural reasons, climate change can lead to increased pressure on diminishing resources of food and/or fresh water.

**Box 3. Urban youth in Kiribati and PNG**

In Kiribati for example, about 50,000 people (half the total population) now live in the ‘capital island’ of Tarawa. In fact, they are concentrated in the most habitable side of this ‘large’ atoll: a strip about 20 km long by 200 meters wide (and of course no more than two meters high). Since families on other islands often send a child to stay with a relative on Tarawa for secondary education, the population there has an even greater proportion of youths than the country as a whole. But in a country with a few resources (at least on land) there is little employment outside government and the government-owned service corporations (telecommunications, shipping etc).

Consequently of the 2000 young people who finish their schooling each year in Kiribati, only about 500 find paid employment within 12 months (Locke, 2009). Nor can they simply go into farming or fishing (the traditional subsistence occupations) as there is no land available for new gardens on crowded South Tarawa, and many do not have access to a boat for fishing (which is also under pressure there). Fortunately, these underemployed youths on Tarawa have kept themselves occupied with sports and other social activities, and although there have clearly been family tensions, as yet few have turned to crime. Most observers attribute this happy state to the strength of the extended family culture in Kiribati, although there are some signs that this is starting to weaken. For example, teenage pregnancy and prostitution (with visiting seamen) are quite significant. Social workers from government and churches have fostered constructive activities for youth, but no one has yet come up with any long-term solutions.

Given demographic trends over the coming decade, the youth problem is likely to get worse in Kiribati, with a rise in petty crime at least, as youth seek resources to sustain their activities.

The problem of unemployed youth is far worse in Papua New Guinea than anywhere else in the Pacific, as many of the unemployed youth in the main town (Port Moresby) have formed into *raskol* gangs and turned to violent crime. In Port Moresby (the capital of PNG) 50% of households have experienced some form of armed violence in the past six months. In PNG, 85% of the population of 6 million still lives a basically subsistence life in rural areas, and the population of Port Moresby is less than 300,000. Thus the proportion of youth ‘hanging round’ the town is smaller than in several other PICs, but their involvement in conflict is far greater.
**Fisheries and climate change**

Pacific Islands’ fisheries will be strongly affected by climate change. These matters because the offshore tuna fishery is a major economic resource for several PICs and inshore fisheries are a major source of food (especially protein) for all coastal-dwelling Pacific Islanders. Thus climate change triggers changes in at least two human security factors: economic inequality and food security.

According to SPC (2008), the major impacts of climate change on PICs will most likely be:

1. Changes to the distribution and abundance of tuna
   - Greater costs for fishing at sea
2. Damage to infrastructure
3. Decline in coral reefs and coastal fisheries
4. Greater risk for freshwater aquaculture

The macro-economic and social impacts of such changes to the offshore tuna fishery are considerable. If the fish and the fishery move eastward as a consequence of climate change (as projected) this could raise tensions between the countries losing fish and those gaining them, as well as within the communities whose canneries would close.

The coastal fisheries are more important than the deep-water fisheries for the food security of Pacific Islanders. In many places these coastal fisheries are being fished at ecologically unsustainable rates, as population rises and in some places (such as Fiji) they include commercial fishing as well as subsistence fishing. The increasingly widespread move to Locally Managed Marine Areas in many PICs is a reaction to this by the communities involved. Coastal fisheries in the Pacific are in ecosystems centred on coral reefs. Coral reefs are very sensitive to temperature, with most coral species ailing or dying if the water temperature exceeds 29°C for more than a few days. This is referred to as ‘coral bleaching’. Global warming therefore poses a major threat to coral reefs, as does acidification of the ocean from increases in dissolved CO₂ (Hoegh-Guldberg *et al.*, 2007). It is a reasonable expectation that such a major change in the ecosystem would adversely affect its fish population. Unfortunately, although coral health has been systematically monitored in the Pacific for at least a decade, the associated fish stocks have not been monitored so thoroughly, and so it is difficult to quantitatively project these impacts of climate change. It is known however that reefs in the Pacific Islands have now mostly recovered from the bleaching episodes of 1997-98 and 2000, in contrast to the more highly stressed reefs in the Caribbean which have not recovered (Morris and MacKay, 2008). And how does this relate to conflict?

There is a historical precedent of conflict arising from food insecurity due to disruption of the reef ecosystem by climate change. Around 1300 AD, global temperatures fell and the sea level fell by about 1m, thereby destroying the inshore reef ecosystems on which most islanders depended for food. Nunn (2007) has established a strong case that this loss of food security is the major reason why many Pacific Island villages relocated inland at about this time, and with only limited food.
availability, reached a pattern of continual warfare from fortified inland villages - a pattern which persisted for several centuries.

5. CONCLUSIONS

The conceptual framework set out in this paper is a fruitful way to analyse the way in which a particular manifestation of climate change or natural disaster can increase tension that is already present in a Pacific island. Gradual climate change (and/or associated sea level rise) or a natural disaster (a ‘triggering event’) leads to physical consequences, which in turn may aggravate one of the socio-economic factors that underlie almost all conflict in the Pacific Islands. This will raise tension in the community. Most obviously this occurs when the ‘physical consequence’ involves relocation of an affected community onto someone else’s land, since almost everywhere in the Pacific Islands; a change in land use or land rights is a contentious issue. A range of case studies are presented in this paper, which between them invoke not only land issues, but six other factors which can underlie conflict (weak governance, economic inequality, food/water insecurity, urbanisation, alienated youth and intergroup tension). Further research would document many more examples, but the present brief survey clearly demonstrates the principle.

A major factor determining whether such an increase in tension leads to violent conflict depends on how tense the situation was before the triggering event: will the trigger push the tension across a threshold of tolerance? Alternatively in some circumstances, the parties involved may perceive the potential damage from climate change as the greater threat, and put aside their differences to work together to alleviate that shared threat.

Are any of the case studies here (or similar events in the next 10 years or so) likely to lead to violent conflict? This requires a deeper analysis than we have been able to do at this stage, but our preliminary opinion is ‘no’. Perhaps the demographic time-bomb in Kiribati may lead to an increase in crime on Tarawa in the next ten years or so, but sea level rise, though undoubtedly aggravating the underlying dynamics, is unlikely to be dramatic enough over that short time frame to be a decisive trigger for conflict.

On the other hand, unless the more industrialised countries (including China and USA) make a dramatic decrease in their greenhouse emissions, sea level rise over the next 30 to 40 years is very likely to render Kiribati and other atoll nations uninhabitable. Relocating some 200,000 people from Pacific Islands will be traumatic for those people but perhaps less so for those countries that are eventually persuaded to accept them, unless they stubbornly refuse to do so. (For example, Australia already accepts over 100,000 migrants annually without significant difficulty.) This issue is undoubtedly a major concern for the Pacific region but from a global perspective would be dwarfed by the 200 million from Bangladesh and other low-lying countries who would also be made environmental refugees by the same sea level rise.
Figure 1. Interactions between climate change, natural disasters and the potential for conflict
Three linked risks to development

Figure 2. Map of the Pacific Islands  [courtesy of E Weber]
Three linked risks to development

Figure 3. Causal chain from climate change/disasters to the potential for violent manifestations of conflict
Three linked risks to development

Table 1: Summary of some Pacific examples illustrating how disasters and/or climate change can lead to potential for conflict. In each case, a natural disaster or manifestation of climate change triggers a ‘physical’ consequence, which in turn aggravates one of the socio-economic factors which underpin conflict in the Pacific. Some cases where conflict was successfully avoided are also listed.

<table>
<thead>
<tr>
<th>Trigger</th>
<th>Physical consequence</th>
<th>Socio-economic factor(s) aggravated</th>
<th>country (case)</th>
</tr>
</thead>
<tbody>
<tr>
<td>disaster (earthquake or volcano)</td>
<td>relocation of people affected</td>
<td>Land; governance; economic inequality</td>
<td>SI (Gizo)</td>
</tr>
<tr>
<td>disaster (earthquake or volcano)</td>
<td>relocation of people affected</td>
<td>None ! (see text)</td>
<td>PNG (Rabaul);</td>
</tr>
<tr>
<td>sea level rise</td>
<td>low-lying atolls become unliveable -&gt; relocation</td>
<td>food/ water insecurity; land</td>
<td>Kiribati; PNG</td>
</tr>
<tr>
<td>Climate change</td>
<td>Decrease in rural food security -&gt; increased migration to towns</td>
<td>economic inequality; alienated youth; urbanisation</td>
<td>Solomon Islands; PNG, Kiribati; Fiji</td>
</tr>
<tr>
<td>Climate change</td>
<td>Offshore tuna fishery moves east</td>
<td>economic inequality</td>
<td>Solomon Islands; PNG; Kiribati; Fiji</td>
</tr>
<tr>
<td>Climate change</td>
<td>Coastal fisheries likely to decline</td>
<td>Food security; intergroup tension</td>
<td>All PICs</td>
</tr>
</tbody>
</table>


NOTES

[1] The EC paper describes these rifts using the terms ‘North’ for developed countries and ‘South’ for developing countries, as though India and China lie south of the equator and Australia north of it. In the Pacific, that terminology is regarded as geographically misleading and is almost never used.

[2] The regional organisations SOPAC and SPREP have been responsible for [separately] co-ordinating efforts on disaster management and climate adaptation respectively, but these functions are being re-organised, at the behest of the Pacific Islands Forum.

[3] The term ‘refugee’ has dubious legal status in this context. UNDP sponsored a conference at the Australian National University in December 2008 on the legal status of ‘environmental refugees’.

[4] The only island in Kiribati which rises more than 3 metres above sea level (Banaba) has no permanent fresh water, and therefore does not offer a viable escape from rising sea levels.
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