

Security and Climate Change: Towards an Improved Understanding

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1. Introduction

Climate change will effect some major environmental changes which, when superimposed on existing environment and development problems, may result in security problems for some individuals, social groups, and countries. It may undermine human security by reducing access to, and the quality of, natural resources that are important to sustain livelihoods. It may, through a range of largely indirect effects, undermine the capacity of States to provide the opportunities and services that help sustain livelihoods. It may be one among numerous coexisting factors that contributes to violence. These risks are interrelated. Beyond these generalisations the ways in which climate change may be a security problem are uncertain because there has not been enough empirical research into the subject to draw robust conclusions. This paper explains in some detail the ways in which climate change may undermine human security, the way human insecurity may increase the risk of violent conflict, and the role of States in human security and peace building. On the basis of this investigation it then outlines the broad contours of a research program for enhancing understanding of climate change and security.

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2. Climate change and human security

As a macro-driver of many kinds of environmental changes such as coastal erosion, declining precipitation and soil moisture, increased storm intensity, and species migration, climate change poses risks to human security (McCarthy et al. 2001). The degree to which people are vulnerable to climate change depends on the extent to which they are dependent on natural resources and ecosystem services, and the extent to which the resources and services they rely on are sensitive to climate change. In other words, the more people are dependent on climate sensitive forms of natural capital, and the less they rely on economic or social forms of capital, the more at risk they are from climate change.

Yet environmental change rarely undermines human security in isolation from a broader range of social factors. These include, among other things: poverty, the degree of support (or conversely discrimination) people receive from the State, their access to economic opportunities, the effectiveness of decision making processes that govern people's lives, and the extent of social cohesion within and surrounding vulnerable groups. These factors determine people's entitlements to economic and social capital that in turn determine their capacity to adapt to climate change so that the things that they value are not adversely affected.

Understanding the way climate change might undermine human security requires place-specific assessments since entitlements to natural resources and services vary across space, and the social determinants of adaptive capacity are similarly varied. In East Timor, for example, some 85% of the population are dependent on agriculture as their sole or main source of income, and the majority of the population are engaged in subsistence farming so that 46% of rural people live below the poverty line of US\$0.55 per day (UNDP 2002, RDTL et al 2003). There is no State-directed system of income support, but there may be customary and Church-lead processes whereby food (and in some places labour) is shared. There is a modest public education system and a very basic public health system. Therefore most rural Timorese have little or no alternative sources of food beyond their own production. Maize is the most important source of food supply, but nowhere is it an irrigated crop. Therefore, in times of low rainfall maize production can be reduced by up to one-third, resulting in widespread hunger and child malnutrition (see Barnett et al. 2003). If climate change results in less rainfall in the dry season, then this may negatively affect a number of things that rural Timorese value, such as sufficient food and good health.

While the focus of human security is the individual, the processes that undermine or strengthen human security are often extra-local. In terms of environmental change, for example, upstream users of water, distant atmospheric polluters, multinational logging and mining companies, regional-scale climatic processes, and a host of other distant actors and larger scale processes influence the security of individuals' entitlements to natural resources and services. Similarly in terms

of the social determinants of vulnerability, warfare, corruption, trade dependency, macroeconomic policies, and a host of other larger scale processes shape the social and economic entitlements that are necessary to reduce an individual's vulnerability (or increase their ability to adapt) to environmental changes. Adger and Kelly (1999) refer to these larger scale processes as comprising the 'architecture of entitlements'. Furthermore, the determinants of human security are as temporally as they are spatially complex: past processes such as colonisation and war shape present insecurities, and ongoing processes such as climate change and trade liberalisation shape future insecurities.

These larger scale processes that shape people's entitlements to natural, economic and social capital may themselves be vulnerable to climate change. Production sectors may be at risk; for example it is not just farmers whose livelihoods are at risk from climate change, but also those whose livelihoods depend on agricultural production such as suppliers of inputs, people who work in transporting and processing agricultural commodities, people who work as extension officers, and people who work in agricultural lending services. The knock-on effects of the decline of certain sectors and the responses of those who depend on them for their livelihoods may in turn impact on other places; for example rural decline can cause migration to urban areas, placing increasing demand on urban services and increasing political pressure on the State.

The State itself is an important provider of various entitlements such as education, health care, law and order, credit, and protective security. If through economic contraction and increasing unemployment the revenues available to the State decline, then its ability to continue to provide certain important entitlements may weaken, which in turn may compound human insecurity for some (this is discussed in more detail in Section 4).

The extent to which system-wide impacts transpire will be determined in part by the degree to which any given national economy is dependent on climate sensitive natural resources, and the robustness and resilience of social institutions to manage change. In both these less direct ways, but also through direct processes such as territorial losses through rising sea-levels, climate change may be a national security issue (Barnett 2003). The risk to national security may be both a cause and consequence of human insecurity.

So, human security is a function of multiple processes operating across space, over time, and at multiple scales. This makes researching the ways in which climate change may affect human security a daunting task, which is not helped by the difficulty of ascertaining whether there are indeed any existing environmental changes that can be attributed to climate-change. Nevertheless, there have been some climate-specific applications of environmental change and human security. Thus far the focus of these has been on the largely local economic and institutional dynamics that limit individuals' and group's access to environmental, financial, and social resources necessary to respond to climate variability and change (for example Adger 1999, Bohle et al 1994, Liechenko and O'Brien 2002). As

well as these climate specific applications, a similar social vulnerability approach has been applied in anthropology (for example Minnegal and Dwyer 2000), development (for example Chambers 1989) and disasters research (for example Blaikie et al 1994). In the field of environmental security many case studies, for example from Northern Pakistan (Matthew 2001), South Asia (Najam 2003), the Niger Delta (Mochizuki 2004), the Pacific Islands (Cocklin and Keen 2000) and Ethiopia (Haile 2004) show that environmental change can be a significant factor that undermines human well-being. All of this research demonstrates that marginalised people are vulnerable to environmental change, and it all justifies the argument that climate change poses significant risks to human security in many parts of the world. What is less clear, however, are the ways in which human insecurity lead to violent conflict. This is important to consider since violent conflict is itself a powerful cause of human insecurity (and vulnerability to climate change - Barnett 2005).

3. Human (in)security and violent conflict

Beyond considering the impact of violent conflict on people, for the most part the issues of human security and violent conflict are treated as separate entities in research. Instead, most research into the cause of violent conflicts, including that from almost all participants in the Greed vs Greivance debate (see Berdal and Malone 2000), focus on the structural conditions that increase the risk of conflict rather than the decisions of actors to engage in violent acts (Cramer 2002, Goodhand 2003, Gough 2002, Moran and Pitcher 2004). Yet violence happens not just because leaders are more able to mobilise some groups of people under certain conditions such as the presence of a weak state (Chossudovsky 1998, Eckstein and Gurr 1975), or the 'lootability' of natural resources (Collier 2000, Le Billion 2001), but also because to varying degrees individuals *choose* to engage in both violence (excluding those who are forcibly conscripted into armed groups) and peace (Cramer 2002, Gilgan 2001, Moran and Pitcher 2004). In other words, structures may shape what agents do, but to some extent agents also shape structures (Giddens 1984).

The role of individuals in initiating, sustaining, resisting or solving violent conflicts is a major lacunae in both the development and violent conflict, and environmental change and violent conflict literatures (the latter more so than the former). So, while there is some speculation that widespread human insecurity – in particular poverty - increases the risk of violent conflict, there are few studies that explain in any detail the ways in which this might transpire. The broad structural factors that seem important to consider when thinking about climate change and violent conflict will be discussed in the following section, for now we wish to explore in a little more detail the connections between human insecurity and the risk of violent conflict.

A common factor in many internal wars is that armed groups are comprised of young men whose expectations for a better life have been frustrated due to contractions in their livelihoods

(Ohlsson 2000). This makes joining an armed group a relatively more rational option to achieve some status in society, particularly when leaders are able to ascribe their poverty to the actions of Other (ethnic, political, geographic, class) groups (Goodhand 2003, Reno 1997). Ohlsson (2000: 8) juxtaposes the situation of declining livelihoods with a more stable state of affairs, arguing that “young men do not (at least not in significant numbers) regularly seek immediate rewards in illegal activities and looting, as long as the society they live in can provide livelihoods and a social position”. Indeed, poor men may have a ‘comparative advantage’ in violence because the opportunity costs of joining armed groups are low (Goodhand 2003). The opportunity costs for women, in contrast, are relatively higher; their reproductive and domestic obligations arguably means they are less likely to engage in acts of organised violence because this would mean forsaking those may be dependent on them (Ohlsson 2003). The gendered division of labour in most countries also makes women the first to suffer from the direct and indirect deprivations wrought by violent conflict (Brittain 2003). Perhaps for these reasons, women are often the most important actors in peace-building endeavours (Mochizuki 2004, Moran and Pitcher 2004).

A number of authors (Goodhand 2003, Nafziger and Auvinen 2002, Ohlsson 2000) hypothesise that it is not so much chronic poverty *per se*, but rather the risk or realisation of sudden poverty that increases people’s propensity to join armed groups. Stewart and Fitzgerald (2000) point to uncertainty about the future as being a critical factor here, and in this sense it is not just potential or actual insecurity that increases the risk of conflict, but also the perception of future insecurity (uncertainty). In this respect the provision of aid, and importantly some certainty that aid will arrive, can help reduce the need for people to use violence to provide for their needs (Gough 2002, Keen 2000). In many developed countries established and effective welfare systems perform this function, which in part helps explain why they experience relatively less frequent and intense violent conflicts than developing countries.

The causes of livelihood contraction are often but not exclusively due to declining access to natural capital caused by, for example, deforestation, land degradation, natural disasters such as drought and flood, and population displacement for agricultural expansion, industrial development, or the building of roads and dams. Declining access to land, or rather to the returns from human uses of land, is seen as a key process that causes livelihood contraction and hence increases the risk that people will join armed groups (de Soysa et al. 1999). Other non-ecological factors such as the rolling back of State services and declining terms of trade also matter, and often interact with natural resource use and people’s access to them in complex ways (Reed 1996). For example, in his analysis of land invasions in a district of Chiapas, Bobrow-Swain (2001) shows that declining agricultural production due to economic and political forces (rather than environmental scarcity) was an important factor in land conflicts. Population growth may be a contributing factor in declining livelihoods, but it is rarely the most significant (Deudney 1991, Hartmann 1998). War itself is a significant cause of livelihood

contraction: violence tends to escalate in part because it generates new causes of grievance and increased impoverishment (Bax 2002). These factors rarely operate in isolation. As argued earlier, there are good grounds to suggest that climate change will result in contracted livelihoods for many people, including losses of land and declining returns from human uses of land.

The issue of inequalities causing violent internal conflicts is somewhat debated, largely because Collier (2000) finds no strong association between income inequality and civil wars. However, many others argue that either vertical (class-based), horizontal (spatially-based), or age-based inequalities are a cause of grievance which leads to either direct action to redress inequality and/or to take revenge, or at least makes it possible for leaders to mobilise the poor under the common cause of grievance (Archibald and Richards 2002, Cramer 2003, Goodhand 2003, Hage 2003, Keen 2000, Nafziger and Auvinen 2002, Reno 1997, Stewart 2000). It is relative rather more than absolute poverty that seems to matter. Because contractions in the livelihoods of some sections of society most often implies increasing inequality (since others are not affected, or may indeed prosper), then this can create conditions more conducive to the outbreak of violence.

It is not just relative, absolute, and transient poverty that can increase the risk of violent conflict, but also a lack of opportunities for individuals and groups to act to improve their lives. Of particular importance here is access to education since it is critical for self-empowerment and increasing the prospects of employment, higher wages, and social mobility. Education offers the opportunity for people to improve their lives. Poverty of opportunities has been seen to be a major factor in the decisions of people – particularly young men – to join militias in Sierra Leone (Archibald and Richards 2002, Keen 2000) and Palestine (Hage 2003), and street gangs in Managua (Maclure and Sotelo 2004).

This focus on agents' decisions reinforces the arguments of Keen (2000), Collier (2000), Duffield (2001), and Reno (1997) that wars are not irrational, but rather are the product of a set of rational decisions that lead to (a violent) reordering of economic and political systems and social relations. However, there are serious limitations to understanding agents only as rational economic actors (Cramer 2002). Joining armed gangs can serve a host of psycho-social needs as well. It can deliver an often badly-needed sense of power and status (Goodhand 2003, Keen 2000), the prospects of some social mobility (Stewart and Fitzgerald 2000), excitement (Keen 2000), and belonging and social recognition (Hage 2003, Maclure and Sotelo 2004). It may also be motivated by a genuine sense of grievance, frustration, and desire for revenge (Archibald and Richards 2002, Bax 2002, Keen 2000, Scheper-Hughes 2004), by identification with a common cause (Burgess et al. 2005, Weinstein 2004), and by a need for protection from violence and denial of economic freedoms (Keen 2000, Mwanasali 2000, Weinstein 2004). 'Generation gaps' between youth and elders can also be a source of frustration and alienation, pointing to the need for inclusive decision-making and conflict resolution processes (Archibald and Richards 2002, Kriger 1992, Reno 1997). Once in a violent group, the *doing* of

violence may be in part because of obedience to authority (Milgram 2004), fear of exclusion from the group, a variety of ‘cultural’ factors (Hinton 2004), and in large part due to training within armed groups and discursive processes that construct and dehumanise Others (Spillmann and Spillmann 1991, Weinstein 2004).

The meaning of violence also matters, as do perceptions of threat and danger (Goodhand 2003). Not unlike the security dilemma whereby countries arm themselves because they perceive dangers from other countries, sometimes leading to iterative cycles of threat perception and armament (arms races), within countries groups may respond to perceptions of threat from others, leading to similar build up of threat perception and capability thereby increasing the risk of violent conflagrations. The role of leaders in generating or mitigating these cycles of antipathy is critical (David 1997, Weinstein 2004).

So, on the basis of the arguments and evidence we have just reviewed, it seems that human insecurity increases the risk of violent conflict. There is no single explanation for *why* individuals and groups who are – or who may or do become – insecure are more likely to join armed groups and engage in violent acts. This should not be surprising, for if violence were mono-causal solutions would be more readily identifiable. However, while the connection between human insecurity and an increased risk of violent conflict seems reasonably strong, this is not by any means to suggest that either: a) the presence of widespread human insecurity, even when coupled with every other possible risk factor, means violence is more likely than not; b) that over history the majority of directly violent acts that have caused trauma and death have been committed by the poor; c) that the forms of structural violence (see Galtung 1969) that are the major cause of morbidity and mortality emanate from the decisions and actions of the poor; and d) that violent conflicts in developing countries are entirely local and caused exclusively by endogenous factors. It does suggest, however, that under certain circumstances, at the same time as it negatively affects human security, climate change may also increase the risk of violent conflict. Livelihood security seems to be an important factor in security from violence, or, in Gough’s (2002: 154) words: “human security depends on a system where each rational individual calculates that it is more profitable not to rebel”. We now turn to discuss some of the larger structural circumstances – in particular the operation of States – that both shape the degree of human security as well as affect the risk of violent conflict, and the ways some of these may be affected by climate change.

4. The State and human security

Human security cannot be separated from the operation of States. States are critical to providing opportunities for people, creating and providing a stable environment so that livelihoods can be pursued with confidence, and providing measures to protect people when livelihoods contract. They

can actively promote or repress rights to personal security, social services, and economic opportunities. They can exercise their sovereign rights to mediate between global flows in ways that enhance or undermine all or certain groups' livelihoods. So the State is a critical institution for livelihoods. Yet given that few, if any conflicts are entirely local, and that most often there are important regional and global forces at work (such as arms trading, the presence of private security forces, cross-border movements of people and goods, foreign investors, and degrees of third party intervention), the role of the State is also central to understanding the causes of and solutions to violent conflict (Reno 2000).

States play critical roles in creating the conditions whereby people can act in ways to pursue the lives they value (Sen 1999). They can provide protective guarantees to assist people when their livelihoods suddenly contract, for example through income support, food aid, or short term local employment programs. They can provide economic freedoms that are important for people to seek employment and to interact to seek mutually advantageous outcomes in terms of consumption and production. The State can provide political freedoms such as the freedom of speech, freedom of the media, civil liberties, and the freedom to vote for parties, leaders and policies. Provision of social opportunities such as education and health care is another important State role. States can provide transparency guarantees to ensure openness and accountability in transactions to mitigate against corruption and to maintain faith in market processes. These State functions are interconnected, they "supplement" and "reinforce" each other (Sen 1999: 40), and their instrumentality is maximised when all are in place. When all 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 (Sen 1999). These are characteristics of 'strong states' that have effective administrative hierarchies, control the legitimate use of force, can mediate impending conflicts before they turn violent, and are more capable of managing environmental degradation and change (Eckstein and Gurr 1975, Esty et al. 1999, Hauge and Ellingsen 2001). In strong liberal-democratic states both the structural conditions and livelihood factors that increase the risk of violent conflict are reduced.

When States cannot provide all these functions the risk of violent conflict increases. Thus internal wars are more likely in countries where the revenue raising opportunities for the State are constrained (which is itself a function of the poverty of the population) (Nafziger and Auvinen 2002). State functions that seem to be of particular importance to mitigate against the generation of violent conflicts include the provision of health care and education, the protection of human rights, establishment and maintenance of a strong and independent judiciary, accountable and transparent police services and armed forces, and the protection of democratic processes (Goodhand 2003, Gough 2002, Keen 2000). Democracy, for example, gives people power to act to affect change – it creates opportunities that reduce the need for violent action to cause change, and it tends to ensure a minimal

level of welfare such that people are less likely to die from, for example, famine (Sen 1999). For these reasons, groups that fall outside of - or who live beyond the protection of - the State, for reasons of geographic but also social distance, are often more likely to experience violent conflict (Keen 2000). Goodhand (2003) points to the emergence of many violent conflicts in ecologically and/or economically marginal regions as evidence that relative poverty and poverty of opportunities due to inadequate access to the State may be a key cause of violence. For example, Bax's (2002) detailed description of the emergence of violent conflict in a Bosnian village shows that contraction of the State and the economy heightened perceptions of inequality within the village, which lead to a progressive reduction of a previously pluralistic community into two groups who respectively dehumanised, and ultimately began killing each other.

Of course, where States actively deny entitlements, or deliberately repress and abuse people, violence becomes a more likely tool of resistance (Nafziger and Auvinen 2002). There can be distinct environmental factors in this process, for example dispossession of land for mining with subsequent environmental impacts and inadequate returns to landholders was a key factor in the formation of the Bougainville Revolutionary Army (Böge 1999); and inadequate distribution of the returns from resource extraction activities has been a factor in violence in West Kalimantan (Peluso and Harwell 2001) and the Niger Delta (Mochizuki 2004, Watts 2001).

There are good grounds to think that when States contract – for example as a consequence of Structural Adjustment and Good Governance Programmes – so that the freedoms and opportunities they provide subsequently contract, violent conflict is more likely (Bax 2002, Bobrow-Strain 2001, Chossudovsky 1998, Gough 2002, Gourevitch 1998, Keen 2000, Nafziger and Auvinen 2002, Reno 1997). So, understanding the way climate change may increase the risk of violent conflict therefore also requires understanding the way it may weaken (or strengthen) the capacity of States to provide or deny opportunities for people, and manage globalisation.

Other factors that increase the risk of violent conflict include: the availability of weapons (Boutwell and Klare 1999); a history of conflict (according to Collier [2000] a country that has recently emerged from civil war has a 40% chance of another war); resource dependence (de Soysa 2000); a 'youth bulge' among the working population (Cincotta 2004); and in-migration. In terms of migration, the influx of migrants into new areas has been a significant factor in many 'environmental conflicts' (see Baechler 1999, Klötzli 1994, Percival and Homer-Dixon 2001, Peluso and Harwell 2001, Swain 1993). So, large migrations have at times lead to conflict, and large migrations are likely as a consequence of climate change (van Ireland et al 1996). However, it is the political and institutional responses to new migrants – rather than the existence of migrants *per se* - that seems to be most important in cases where migration is a factor in violent conflict (Goldstone 2001), so these social dynamics of host communities are important areas for study. Further, people rarely migrate for environmental reasons alone, so understanding the way climate change may induce more migration

also requires understanding the way it will interact with other factors (Meze-Hausken 2000). It also requires understanding the strategies people use to adapt to environmental changes, of which temporary, and ultimately permanent migration is but one (Davies 1996, Meze-Hausken 2000, Mortimore 1989).

Despite the evidence that contraction in livelihoods, poverty (chronic, transitory, and relative), weak states, and immigration are all risk factors in violent conflict, and despite research that suggests that climate change may have direct and indirect negative effects on these risk factors, there is still much uncertainty about the ways in which climate change may increase human insecurity and the risk of violent conflict. Given this uncertainty, there are dangers in speaking prematurely and vociferously about climate change in the language of security (see Barnett 2003). Much more research is required, and so we now turn to outline a potential research programme to gain a greater understanding of the ways climate change may increase insecurity.

5. Towards an improved understanding

This paper has also attempted to address the role of agents in conflicts as well as the relatively much more studied role of structures. The circumstances of individuals can be more or less conducive to their participation in violent conflicts, and so human security is not just important in its own right, but also because it relates to the generation of violence. Agents can act effectively to build peace and end violence, and to achieve their aims in non-violent ways, and this too is a critically important area of study (Gilgan 2001, Moran and Pitcher 2004).

So research on climate change and its potential effects on human security is in many important respects at the same time research on climate change and its potential to cause violent conflict. It demands research that investigates a diverse array of structural factors operating over time and across an array of spatial scales – of which climate change is but one - that can strengthen or undermine human security. It also demands research that can ground the effects of these structural processes in the local contexts in which agents sustain their livelihoods (Matthew and Dabelko 2000). There is also a need to try and study places and processes *as they happen* not merely ex-post conflict, and regardless of whether violent conflict is an outcome since for the purposes of policy understanding what sustains human security and peace is as important as understanding what causes human insecurity and violence. Nevertheless, selecting places that seem to be most at-risk from climate change – either on the basis of their resource dependency, and/or their seemingly relatively high risk of violence - can enhance the efficiency of research on climate change and security.

With these points in mind, we now outline the broad contours of a research program for understanding climate change and security. Such a programme would ideally be conducted by researchers who come from the places being studied (both for reasons of greater background and

improved reliability of findings, and because research is a good way to build in-country capacity). We discuss in particular research at two levels: at the local level, and at the level of States.

Researching change at the local level

Climate change will effect some major environmental changes that can undermine human security. Understanding how this might happen requires understanding the extent of different groups' vulnerability to climate change and their possible responses to it, including the risk of violent conflict. This requires understanding the way people live and the factors that determine their livelihoods, which necessitates local-scale fieldwork. Local studies can reveal much about the processes that cause or prevent human insecurity and violence in places where theory would suggest it is most likely to arise. They enable theories to be developed inductively (from the bottom up), as opposed to the prevalence of deductive theories in much of the research on environmental change and security.

In terms of the kinds of local studies that are required, it is important to recognise that environmental changes may be sudden (for example droughts or floods), and also long-term (for example declining mean precipitation, soil degradation, and coastal erosion). The social factors that shape people's capacity to respond to the changes can be similarly sudden (for example civil war or currency devaluations) or long-term (for example systemic gender discrimination or declining commodity prices). So, baseline data on local social and ecological conditions, and ongoing monitoring of them, is required to better understand the social and environmental processes that may lead to, or avert, climate-induced security problems. This data can be both quantitative (for example on household incomes) and qualitative (for example on perceptions of equity). Building on recent methodological developments in both environmental security and climate impacts research, a mixture of methods can be used to collect data. Primary data can be collected through household livelihood surveys, interviews, focus group meetings, participant observation, and evaluation of specific local projects and programmes. In combination, diverse data collection methods can allow a detailed understanding of social life, vulnerability, adaptive capacity and security to emerge. The repetition of each data collection method over time can provide an assessment of change, and this longitudinal dimension is important.

Researching the role of the State

While local studies are important, larger structural processes also matter. Of critical importance here is the role of institutions that enhance or reduce vulnerability to climate change and the knock-on effects of climate impacts on other places and aspects of social systems (so institutions themselves may need to adapt). Institutions are seen to be one of the most important determinants of capacity to adapt to climate change (Smit and Pilifosova 2001). They are also critical in the management of security problems, including conflict (Keohane 1989). The term 'institutions' is contested, but is understood here to be "a persistent, reasonably predictable arrangement, law, process, custom or organisation

structuring aspects of the political, social, cultural or economic transactions and relationships in a society” (Dovers 2001: 5). They are the ritualised practices that maintain social cohesion and collective responses to changes. They include, but are more than, organizations and regimes. They occur at various scales ranging from marriage to the United Nations.

There is no single agreed theory of institutional adaptation, nor are there clear criteria for what constitutes an ‘effective’ or ‘successful’ institution (Adger 2000). There is an emerging consensus, however, that a number of factors matter, including an institution’s legitimacy (moral and/or legal), its responsiveness to its constituents, its core values and its commitment to them, its ability to learn and experiment, the amount of resources available to it, its independence from short-term political pressures, the quality of its management, and the transparency of its decision making (Dovers 2001, Goodin 1996).

There are multiple and overlapping institutions operating at various scales that are and will be directly and indirectly involved in exacerbating or alleviating the adverse effects of climate change. These include local, national, regional (where applicable, as for example in the Pacific Islands region) and global governance institutions that make decisions and implement policies that directly (for example the UNFCCC), and indirectly (for example development agencies) affect capacity to adapt to climate change. An important task for research on climate change and security is therefore to identify the capacity of these institutions to manage the adverse effects of climate change so that they do not become security problems. Not all of these are amenable to empirical research, but the operation of the most important larger scale institution – the State – can be studied.

Because many of the determinants of vulnerability are either locally or State-derived, it makes sense to study State processes in the same countries that local-scale fieldwork is being conducted. That many important global processes such as development programs, trade and financial flows, and multilateral negotiations (on climate change, but also human rights, security, trade, and so on) flow through States adds to the value of studying the State to understand climate change and security.

So, studying the capacity of various State institutions to manage the security risks of climate change is important. These institutions include climate-specific groups such as national climate change teams and environment and resource management agencies. However, institutions engaged in management of problems that may arise from climate change such as: increased rural-urban migration (land tenure institutions and urban planning agencies); increased morbidity (health service providers); increased climatic hazards (disaster management arrangements); increased demand for development assistance (diplomatic and development agencies); and increased violent disputes and crime (the judiciary and the police) are also important.

6. Conclusions

The following table summarises some of the key arguments in this paper about the ways in which climate change may undermine human security and may, in conjunction with an array of non-climate specific factors, increase the risk of violent conflict. The table and the discussion in Section 2 builds on what is known about the vulnerability of individuals and groups to climate change. It is important to stress that climate change will not undermine human security or increase the risk of violent conflict in isolation from other important social factors. So, while the table reduces our arguments it should not be read as a simple statement of the ways climate change can be a security problem, nor as a blueprint for reductionist research. We also stress again that the set of climate change factors does not cause violent conflict, but rather merely affect the parameters that are sometimes important in generating violent conflict.

The relationship between determinants of human insecurity, violent conflict and climate change

<u>Factors affecting violent conflict</u>	<u>Processes which climate change could affect/exacerbate</u>
Vulnerable livelihoods	Climate change is likely to cause widespread impacts on water availability, coastal regions, agriculture, extreme events and diseases. These affect livelihoods by exposing people to risks, thereby increasing their vulnerability. The impacts will be more significant in sectors of the population with high resource-dependency, and located in more environmentally and socially marginalised areas. Some of these climate driven outcomes are long term and chronic (such as declining productivity of agricultural land), while others are episodic (such as floods).
Poverty (relative/chronic/transitory)	Poverty (and particularly relative deprivation) is affected by the spatial differentiation of climate impacts and the sensitivity of places to them. Climate change may directly increase absolute, relative, and transient poverty by undermining access to natural capital. It may indirectly increase poverty through its effects on resource sectors and the State. Stresses from climate change will differentially affect those made vulnerable by present political-economic processes.
Weak states	The impacts of climate change are likely to increase the costs of providing public infrastructure such as water resources, and services such as education, and may decrease State revenues. So climate change may decrease the State's ability to create opportunities and provide important freedoms for people, as well as decrease the State's capacity to adapt and respond to climate change itself.
Migration	Migration may be one response of people whose livelihoods are undermined by climate change. However climate is unlikely to be the sole, or even the most important 'push' factor in migration decisions. Yet large-scale movements of people may increase the risk of conflict in host communities.

It seems evident that climate change poses risk to human insecurity principally through its potentially negative effects on people's livelihoods. This is the *a priori* reason why climate change is of great concern to many people. Yet there is need for considerably more research on the ways it may undermine human security, not least because the level of understanding of people's vulnerability is still sufficiently uncertain for the purposes of designing effective adaptation strategies. Yet, because the actual or perceived insecurity of people due to a wide range of processes – including livelihood contraction– is a factor in many violent conflicts, human insecurity caused in part by climate change may in turn lead to more conventional security problems.

Both security and climate change problems are determined by complex interactions across global, regional, national and local institutions. Understanding the processes whereby climate change may lead to security problems requires having a sound understanding of the ways in which it may affect environmental changes in localities, and the extent to which people are vulnerable to these changes. It requires understanding not just these social-ecological interactions in places, but also the many economic, political, cultural and social interactions between different places and the ways these might be altered by climate change. It requires understanding different groups' capacities to adapt to change, and the limits of those capacities. It requires understanding the potential for violent outcomes when these capacities fail. Critically important among the larger scale institutions is the State. So, what is required is a multi-level, cross-scale, and longitudinal research approach that enables understanding of the political-economy of climate insecurities, and management of them. Such research can reduce uncertainty about the human dimensions of climate impacts, enhance knowledge of potential adaptation strategies, and contribute to dialogue about of the levels of greenhouse gas emissions that may be considered to be dangerous.

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