



## Forced Migration Online (FMO) FMO Research Guide on Climate change and displacement

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### **Abstract**

This research guide aims to offer an introduction to the complex issues of the migration (displacement)-environment nexus, highlighting the emergence of the term *environmental refugee*, and the debate that surrounds it. This guide does not intend to provide a comprehensive discussion of what constitutes environmentally forced migration and as such remains open for further revision and additional research. It will explore three main dimensions of the debate focusing on the notion of *environmental refugees*. The first, will explore the terminology *environmental refugee* and appropriate classifications under such a definition; the second, will explore the real world applicability of such a definition -whether such people even exist? If so, how many? Can environmental factors be scientifically identified as a root cause of displacement? Finally, this guide will explore the issue of protection for environmental-induced displaced people.

**Keywords:** Climate change, climate variability, environmental change, environmental refugees, disasters, disaster-induced displacement, adaptation, resilience, vulnerability.

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## 1. Introduction

A significant body of literature has emerged over the last two decades documenting the potential and observed impacts of climate change on many different natural and social systems. This research demonstrates that climate change has impacted upon, and will continue to impact upon ecological and social systems potentially causing substantial human displacement.

Scholars and scientists predict that climate change will decrease the capacity for human subsistence. Accordingly, in their view, climate change will degrade the environment, leaving areas uninhabitable, changing rainfall patterns, soil fertility and the availability of freshwater. Additionally, these scientists and scholars predict extreme and unpredictable weather, rising sea-levels and global temperature changes which will heavily effect agricultural production and the people's livelihoods. This in turn will force people to migrate, anticipating that 'millions are displaced by shoreline erosion, coastal flooding and severe drought' (IPCC1990:20). As such, this displacement could result in a humanitarian crisis with vast security implications. This apocalyptic vision is scientifically grounded, and its consequent outcomes could lead to increased political tensions, conflicts and the destabilisation of international regimes due to the great pressure environmental-induced migration could have on both *sending* and *receiving* states.

Although concerns about the potential of mass environmental-induced displacement are not new, there is remarkably little literature on the subject that addresses the interplay between environmental changes, stresses on ecological systems, socio-economic vulnerability and consequent population displacement. In fact, existing literature shows a dearth of detailed research. As a result, these links are poorly conceptualised, often reduced to simplistic and misleading explanations that deny the complex and multivariate processes – environmental, political, social and economic – which form the root causes of conflict and forced migration.

It is with this in mind that this research guide aims to offer an introduction to the complex issues of the migration (displacement)-environment nexus, highlighting the emergence of the term *environmental refugee*, and the debate that surrounds it. This guide does not intend to provide a comprehensive discussion of what constitutes environmentally forced migration and as such remains open for further revision and additional research. It will explore three main dimensions of the debate focusing on the notion of *environmental refugees*. The first, will explore the terminology *environmental refugee* and appropriate classifications under such a definition; the second, will explore the real world applicability of such a definition -whether such people even exist? If so, how many? Can environmental factors be scientifically identified as a root cause of displacement? Finally, this guide will explore the issue of protection for environmental-induced displaced people.

In addition, this guide aims to introduce readers to key definitions and core literature on three emerging concepts -resilience, vulnerability and adaptation- that are fundamental to understanding 'the human dimensions of global environmental change' in both slow onset environmental degradation and natural disasters.



## 1.1 The complexity of the debate around environmental-induced displacement

Climatic and environmental changes, both natural and man-made, are increasingly visible and so are the resulting impacts on population movement. Rising sea levels, deforestation and dry-land degradation, as well as natural disasters pose challenges to development and livelihoods, settlement options, food production and disease. These environmental events and processes have led and will continue to lead to displacement, both internally within states and internationally across recognised borders.

Growing global concern surrounding the nexus of migration (or displacement) and climate change sheds light on the interdependent relationships of the environment, human settlement and mobility. Consequently, there is a need for further research, increased interdisciplinary collaboration and the development of comprehensive approaches as promoted by many institutional bodies.

Migration and the changing global environment are multidimensional and complex issues. The link between migration and the environment, as both cause and consequence of displacement, show long-term and short-term patterns on population livelihoods and mobility. Moreover, migration, environmental change and extreme natural events are by their very nature cross-border issues which merit consideration at international policy levels. Governments and other stakeholders will need to enhance their preparedness for individual extreme events, as well as for gradual changes in human settlement and mobility patterns. Thus an interdisciplinary and holistic approach needs to be developed in order to identify measures both for emergency assistance in the short-term and for long-term adaptation measures, such as diversification of livelihoods accompanying other political, economic and social strategies.

## 1.2 Global climate change debate

According to the report of Working Group I of the International Panel of Climate Change (IPCC), the average global surface air temperature is projected to increase from anywhere between 1.4°C and 5.8°C during the time period 1990 to 2100 (IPCC 2001). Evidence indicates the Earth's climate system is warming in a way that has no precedent in the history of human civilization (IPCC 2007; Stern 2007).

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). In most parts of the world, the impacts of climate change on social ecological systems will be experienced through both changes in mean conditions (such as temperature, sea-level and annual precipitation) over long timescales, and also through increases in the intensity and frequency of floods, droughts, storms and cyclones, fires, heat-waves and epidemics.

Outside of these short- and long-term projected changes, there are also somewhat more unquantifiable consequences of high-impact events. These include melting of glaciers and permafrost, which may add several metres to global sea levels; collapse of the thermohaline circulation, which may cause significant regional climate changes



in the northern hemisphere; and large scale shifts in the Asian monsoon and the *El Niño* Southern Oscillation phenomenon.

Climate change and variability, either induced by unsustainable human practices and/or by natural forces, are frequently blamed for these trends. The occurrence of extreme events is increasingly determined by the hydro-climatic events (such as rainfall) impacting upon an environment already modified by human activities. Deforestation and land degradation are not only signs of a poverty-driven exploitation of the natural resources, but also demonstrate that the pursuit of short-term economic gains is not without future costs (Bogardi 2004:362).

The global population is predicted to increase from the current 6 billion to some 9 to 11 billion people over the next two generations. This will substantially increase the pressure on Earth as its inhabitants seek to feed and sustain themselves. Unsustainable livelihoods in rural communities drive millions every year to migrate into cities. It is widely expected that some two thirds of humanity - about 5 billion people - will live in urban centres by 2025 (UNFPA 2007).

### Websites

- **International Institute for Sustainable Development (IISD)** - <http://www.iisd.org/security/es/resilience/climate.asp>
- **International Human Dimensions Programme on Global Environmental Change (IHDP)** - [www.ihdp.org](http://www.ihdp.org)
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- **United Nations Development Programme (UNDP) Climate Change** - <http://www.undp.org/climatechange/>
- **United Nations University Institute for Environment and Human Security (UNU-EHS)** - <http://www.ehs.unu.edu/>

## 2. Environmental refugees: conceptual issues

### 2.1 The construction of a 'definition'

The term *environmental refugee* first emerged in the 1970s and was codified in the mid-1980s. In the 1990s the issue became more popularised. Throughout this period, the various definitions of *environmental refugee* that emerged did not distinguish between persons migrating across international borders and those who did not, conflating globally recognised labels of 'refugees' with 'internally displaced persons' (IDPs).

EI- Hinnawi expounded the standard definition of 'environmental refugees' as:

'Those people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental



disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life. By “environmental disruption” in this definition is meant any physical, chemical and/or biological changes in the ecosystem (or the resource base) that render it, temporarily or permanently, unsuitable to support human life’ (1985:4).

He identified three major types of environmental refugees: those temporarily dislocated due to disasters, natural or man-made; those permanently displaced due to drastic environmental changes, such as the construction of dams; and those who migrate as a result of the gradual deterioration of environmental conditions. He also included an additional smaller category those people who were displaced by the destruction of their environment as a result of warfare.

In the same vein, Jacobson identified different types of environmental refugees:

‘Those displaced temporarily due to local disruption such as an avalanche or earthquake; those who migrate because environmental degradation has undermined their livelihood or poses unacceptable risks to health; and those who resettle because land degradation has resulted in desertification or because of other permanent and untenable changes in their habitat’ (1988:37-38).

In mid 1990s, Myers, the most prolific writer on the topic, defined environmental refugees as:

‘People who can no longer gain a secure livelihood in their homelands because of drought, soil erosion, desertification, deforestation and other environmental problems. In their desperation, they feel they have no alternative but to seek sanctuary elsewhere, however hazardous the attempt. Not all of them have fled their countries, many being internally displaced. But all have abandoned their homelands with little hope of a foreseeable return’ (1994:6-7).

What these definitions all have in common is the assumption that environmental disruption caused by different types of factors can result in forced displacement, both temporary and permanent. Whilst articulating human agency in voluntary and involuntary migration, Bates (2002:468) offers a *vague* definition of environmental refugees as ‘people who migrate from their usual residence due to changes in their ambient non-human environment’.

Moreover, Bates (in line with El-Hinnawi, Jacobson and Myers) suggests a categorization of environmental refugees based on criteria related to the origins of the environmental disruption (natural or technological), its duration (acute or gradual), and whether migration was a planned outcome or not. He argues that migration flows resulting from unintended outcomes, or disruptions, can be divided into three categories: disasters, expropriations and deterioration:

‘Disaster refugees originate in acute events that are not designed to produce migration. These may be divided between those events caused by natural events and those caused by technological accidents; expropriation refugees result from acute anthropogenic disruptions in the environment that intentionally dislocate target populations. These may be further divided into two groups based on whether the disruptive event was caused by economic development or warfare; deterioration refugees migrate as a result of gradual, anthropogenic changes in their environments that were not intended to produce migrants. Deterioration refugees tend to come from



ecosystems that have gradually degraded to a point where people cannot survive on the local resource base. This type of refugee may be analytically separated into sub-groups by the source of the degradation in terms of pollution and depletion' (Bates, 2002:469).

Bates, therefore, goes further than El-Hinnawi's general definition, whilst still encompassing both rapid onset events as well as gradual environmental deterioration. More recently, Renaud *et al.* (2007:29) build upon the work of Black (2001) and Flintan (2001) to identify three different categories of 'environment-related mass movement of people': environmentally motivated migrants; environmentally forced migrants; and environmental refugees. Renaud *et al.* correlated these categories to the nature of an environmental trigger, as well as to the type of assistance available to affected communities. Significantly, in this categorisation, assistance available to the displaced is based on the assumption that:

'Persons do not want to leave their place of residence (since here we are discussing situations of forced migration in which environmental degradation or change is the main reason for displacement or migration and not for example, economic reasons) and therefore by stating that the different levels of help available we mean help available to create a situation in which a person does not have to depart' (Renaud *et al.* 2007:31).

In their analysis, the authors attempt to categorise gradual (direct or indirect) environmental change and degradation that contributes to the decision to migrate, and then correlate this to available coping mechanisms, including assistance. Moreover, Renaud *et al.* include in their analysis two criteria to address the severity of the environmental process and the potential for return to places of origin, in order to better account for 'whether an environmental degradation process is directly triggered or is a secondary manifestation of other drivers' (King 2006:546).

Despite these attempts to define *environmental refugees*, the concept remains somewhat vague and is hotly debated. These various definitions have been criticised by some scholars as unhelpful and unsound, while the concept itself has been dismissed as unnecessary in practical terms (see McGregor 1993; Kibreab 1997; Black 2001; Trolldalen et al. 1992; Wood 1996; 2001).

Two primary points of contention are evident in the literature: the extent to which environmental change is a factor in migration decisions; and the definitional use of the word 'refugee' instead of 'migrant'. These issues will be addressed in subsequent sections.

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- **IOM – Environment and migration research website** - <http://www.iom.int/jahia/Jahia/pid/1824>
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- **Tearfund – Climate Change campaign**  
<http://www.tearfund.org/Campaigning/Climate+change+and+disasters/>
- **United Nations University Institute for Environment and Human Security (UNU-EHS) -**  
<http://www.ehs.unu.edu/>

## 2.2 Environmental-induced migration: a multi-causal relationship

Critics argue that the definition of environmental refugees is based on a simplistic casual relationship, which oversimplifies the complex root causes of forced migration. They refer to a failure to view migration and displacement as a complex and multivariate process. It is argued that placing such an emphasis on environmental causes - by labelling a sub-set of displaced persons as 'environmental refugees' - oversimplifies the phenomena.

Migration, as noted by Castles (2002) involves a 'complex patterns of multiple causality, in which natural and environmental factors are closely linked to economic, social, and political ones'. Lonergan's studies of El Salvador, Haiti, Sahel and Bangladesh substantiated this claim, contending it is a complex mixture of social, economical and institutional factors that cause displacement (1998:9).

Thus, environmental degradation and resource depletion play a contributing role in affecting population movement, as they are often filtered through contexts of poverty, food deficiency, social inequity and personal insecurity. The result is that people can be forced to leave their traditional habitat, temporarily or permanently, because of a lack of access to natural resources and/or an environmental disruption that jeopardized their existence and seriously affected the quality of their life (Stojanov 2006:2).

In his examination of displacement in the Horn of Africa, Kibreab (1994; 1997) claims that the causes of refugee flight were 'many, varied and interlinked'. The same argument has been strongly developed by Lee who looked at the cases of Bangladesh, North Korea and Sudan, concluding people fled their homes for multiple reasons, which included environmental factors, but also involved human-induced disasters, international factors and government incidents (2001).

In reviewing environmental changes and migration in Chitwan Valley in Nepal, Massey et al. argues that:

'a single environmental effect,[...] is just one of a set of factors that influence long distance mobility and it is by no means the most important. Both social capital and human capital have much stronger and more consistent effects on migration out of Chitwan' (2007:22).

Vulnerability to climate change therefore can depend on the extent to which people are dependent on natural resources and ecosystems, the extent to which these



resources and services they rely on are vulnerable to changes in climate and their capacity to adapt to these changes:

'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' (Barnett and Adger 2007:3).

Reuveny further analysed the relationship between conflict and environmental-induced migration, arguing that migration can be viewed as an adaptive strategy to confront climate change. Accordingly, he asserts, that those facing severe environmental degradation due to climate change have three choices: try to mitigate the effects, do nothing and accept a lower quality of life or leave the affected areas (2007:3).

Reuveny's premise is that individuals have agency in their decisions to migrate, and will choose to move if they consider the net benefit of moving as larger than that from not migrating. Facing several possible destinations within and outside their countries of origin, individuals and communities choose the option that provides the largest net benefit. Thus, while migration may be one response to climate change, climate change itself is unlikely to be the sole or even the most important 'push factor' in migration decision.

Consequently, people rarely migrate for environmental reasons alone. A range of factors informs the migration decision. Moreover, these factors are in a constant state of flux as a consequence of the economic and cultural effects particular to a specific locale. A sensitive understanding of the way climate change may induce migration therefore requires understanding the way it will interact with other factors, and the ways these factors may change as a result of the altered climate and impact upon social and ecological systems.

In reality, movement takes place in response to a combination of stimuli: environmental, economic, social and political. Thus, separating environmental processes from the structures within which they are embedded is both difficult and can be viewed as a distortion of reality.

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### 2.3 Environmental-induced migration: a human security framework

In light of this multi-causality perspective, some authors have utilised the concept of *human security* as useful framework for researching this topic. Human security, in climate change terms, can be conceived as a condition where individuals and communities have the options available to them to end, mitigate, or adapt to risks to their human, environmental, and social rights. It might also encompass the capacity and freedom to exercise these options or actively participate in attaining them (GECHS 1999).

This people-centred concept focuses on enabling individuals and communities to respond to change, either by reducing vulnerability or by challenging the drivers of environmental change. More than a measurable and objective state, human security is something that is felt and experienced, and it is fundamental to every individual's well-being (Barnett 2001; Barnett and Dovers 2001).

People are vulnerable to ecosystem changes according to their dependence on these ecosystems for their livelihoods, the extent to which those ecosystems are sensitive to climate change, and their capacity to adapt to these changes. Capacity to adapt is a function of access to economic resources, technologies, information and skills; the degree of equity in a society; and the quality of governance. It generally follows that low-income people and societies are more vulnerable to climate change than wealthy people and societies. Climate change can therefore be viewed as an issue of 'global justice': the societies most responsible for the emissions of greenhouse gases are the least vulnerable, because of the adaptive capacity conferred by the wealth they have generated through forms of development that pollute the environment.

Environmental change does not undermine human security in isolation. Its impacts are felt within a broader range of social factors, including poverty, levels of state support, access to economic opportunities, the effectiveness of decision-making processes, and the extent of social cohesion within and surrounding vulnerable groups. These factors determine a population's access to economic and social capital, which in turn determine their capacity to adapt to climate change (Barnett and Adger 2007:3).

Conceptualising environmental change as an issue of human security requires addressing questions concerning equity, justice, vulnerability, power relations, and, in particular, about whose security is actually threatened by environmental change (O'Brien 2006:2).

Present research on vulnerability to climate change investigates the diverse array of social and environmental factors operating over time, and across an array of spatial scales, that structure vulnerability (O'Brien et al. 2004). These factors include the vulnerability of resources such as freshwater, soils, reefs and fisheries; sudden and incremental changes in the climate; the degree to which households and communities rely on these resources to meet their needs and values; and the capacity of social systems to adapt to changes in the temporal distribution and abundance of these resources so that household and community needs can continue to be satisfied (Barnett and Adger 2007).



Another crucial element of human security research linked with climate change aims to enhance understandings of climate insecurity as a consequence of livelihood insecurity - a factor that potentially increases the risk of violent conflict. Key risk factors include: opportunities to gain income elsewhere (often a function of labour markets and may involve migration); a past history of violence; ineffective systems of justice; availability of weapons; ineffective or non-existent public and private welfare systems; and poor access to opportunity-enhancing services, such as education and health care (Barnett and Adger 2007).

There is arguably a need, therefore for research into environmental change within the wider context of economic, social, institutional, political, cultural and technological change. This requires considering environmental issues, not as isolated problems but rather in relation to associated concerns about poverty, health and conflict. It requires understanding the ways in which people may respond if climate change undermines their livelihoods, as one outcome might be an increased propensity for people to engage in violence as an alternative livelihood strategy.

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- **CICERO - Human Security and Climate Change - An International Workshop** - [http://www.cicero.uio.no/humsec/list\\_participants.html](http://www.cicero.uio.no/humsec/list_participants.html)
- **Center for Unconventional Security Affairs, at the University of California, Irvine** - <http://www.cusa.uci.edu/>
- **Global Environmental Change and Human Security (GECHS)** - [www.gechs.org](http://www.gechs.org)
- **Institute for Environmental Security** - <http://www.envirosecurity.org/>
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- **Red Cross/Red Crescent Centre on Climate Change and Disaster Preparedness** - <http://www.climatecentre.org>
- **Woodrow Wilson Environmental Change and security Programme** - [http://www.wilsoncenter.org/index.cfm?fuseaction=topics.home&topic\\_id=1413](http://www.wilsoncenter.org/index.cfm?fuseaction=topics.home&topic_id=1413)

## 2.4 Refugees or forced migrants?

In reviewing the debate over whether the appropriate label should be 'refugees' or 'forced migrants', Castles argues that using a non-legal definition can be not only incorrect and misleading from an international refugee law perspective, but also 'possibly harmful' (2002:10). Castles argues that it potentially erodes the concept of international protection as it may 'encourage receiving states to treat [refugees] in the same way as "economic migrants" to reduce their responsibility to protect and assist' (McGregor 1993:162).



*Environmental Migration?* InterSecTions. Interdisciplinary Security ConnecTions Publication Series of UNU-EHS No. 5/2007. Available at: <http://www.ehs.unu.edu/file.php?id=259>

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- **United Nations High Commissioner for Refugees (UNHCR)** - <http://www.unhcr.org>

### 3. Data debates: the politics of statistics

In 1999, Crisp wrote that it is 'almost impossible to think or write about refugee-related issues without some reference to statistics' (Crisp 1999). Indeed, statistics remain central to the debate over migration as well as its links to climatic and environmental change.

Numerous fundamental questions about numbers are being asked in scientific, policy and academic circles. How many environmental refugees are there? What proportion of them are internally displaced? How many have crossed international borders? To which destinations have they gone? Are these numbers predictable'.

These questions are difficult to answer due to lack of clarity and agreement over definitions and the complex nature of migratory processes resulting in 'a rather complicated exercise because of the diversity of factors that come into play and their complex interactions' (Döös 1997; Renaud et al. 2007:16). This has resulted in an absence of reliability of data. Despite the lack of concise and widely-agreed definitions, several analysts and institutions have attempted to estimate the number of *environmental refugees*.

#### 3.1 Statistical data

In 2002, the UNHCR estimated that approximately 24 million people around the world were displaced because of floods, famines and other environmental factors (UNHCR 2002). Several years earlier, the Almeria Statement claimed that 135 million people could be at risk of displacement as a consequence of severe desertification (Almeria Statement 1994). Myers (2002; 2005) estimates that in 1995 some 25 million people migrated due to environmental factors. He further asserted that there was a possibility that this number would double by 2010, and that later in the 21<sup>st</sup> century there would be approximately 200 million environmental refugees as a result of global warming. The Stern Review (2007) foresaw an additional 200 million 'climate change migrants', asserting that widespread resource scarcity will lead to mass migration. Stern also claims that the sheer scale of the problem will hamper efforts to limit the consequences and manage migration to areas which are perceived at lower risk. Attempts to seal off wealthier regions will lead to social conflict as the those in need attempt to migrate to these areas.

Nicholls (2004) suggests that between 50 and 200 million people could be displaced by climate change by 2080. Friends of the Earth argued that 'with predictions of climate refugees at 200 million worldwide – and 1 million from small island states – by 2050, there is a pressing need to address this issue' (Friends of the Earth



2007:10). Meanwhile, Christian Aid estimates that 1 billion people will be forcibly displaced by 2050, principally arising from climate change-induced natural disasters. By 2050, Christian Aid states, 'twice as many people could be displaced by conflict and natural disasters, but 250 million could be permanently displaced by climate change-related phenomena such as droughts, floods and hurricanes, and 645 million by dams and other development projects, based on a current rate of 15 million people a year' (Christian Aid 2007:5).

### 3.2 Counting and research difficulties: realist vs catastrophists

Needless to say, there is much criticism and debate surrounding the statistics provided above, the methodologies used to reach them, and the underlying assumptions behind them. Renaud *et al.* argue that 'generalisations in estimating the number of environmental migrants/refugees on a global scale are fraught with difficulties' (Renaud *et al.* 2007:16) which might be used to instil fear in people and institutions who may be influenced by the vision of waves of refugees (Lonergan and Swain 1998).

Despite these catastrophic projections, which have attracted much media attention (Vidal 2007; Leake 2007), there is a recognition that poverty, vulnerability and migration are linked, albeit there is not a complete overlap. Mobility and flexibility in income-generating opportunities are critical under conditions of climate change. This is partly due to a reduced dependency on climate-sensitive activities and partly due to an ability to access different opportunities, according to the extensive literature on development and the environment (Huq *et al.* 2006; DFID 2006).

Not all disasters affect the poorest most:

'yet poorer people tend to be both more exposed and more susceptible to hazards, suffer greater relative loss of assets, and have a lower capacity to cope and recover. Furthermore, disasters can induce poverty, making better-off people poorer and the poor destitute despite programmes aimed at fighting poverty'(DFID, 2005:3).

Thus, difficulties in counting and enumerating environmental refugees derive from a lack of conceptual development: vagueness coupled with statistical biases that compromise the possibility to produce data that is meaningful, reliable and comparable. Castles (2002) argues that conceptual problems do not negate the possibility that environmental factors can be an important trigger of migration in clear-cut cases – such as that of a natural disaster - as well in less obvious situations, such as that of gradual environmental change.

Although migration models are useful tools for predicting migration fluxes, accounting for all *push* and *pull* factors, detailed and scientific research result to be crucial in determining *cum grano salis* the global scale of environmental forced migrants.

In addressing the question 'can large scale environmental migrations be predicted?', Döös (1997) argues that there are numerous factors that can contribute to an increased risk of environmental migration. These are not limited to stresses on the environment, but include a variety of socioeconomic and political factors. National and international wars can, through feedback processes such as the destruction of environment or access to natural resources, cause or augment involuntary



## 4. Environmental degradation and natural disasters

Events in recent years, such as floods and landslides in Philippines and Bangladesh, Hurricane Katrina, the Southeast Asian tsunami, the Pakistan earthquake, as well as bird flu and continuing droughts in Africa, dramatically illustrate the potential vulnerability of human society, the consequences of displacement and the importance of disaster risk reduction.

Global warming is expected to influence the normal range of weather patterns in two principal ways. First, there will be gradual changes in average weather patterns (such as precipitation patterns will result in either floods or droughts). Second, there will be an increased variability of extreme weather events associated with changes in surface temperature and precipitation. Already, in the past decade, weather-related natural hazards have been the cause of 90 per cent of natural disasters, the majority of which are located in the global South (IFRC/RCS 2005).

### 4.1 Slow onset environmental degradation and migration

Cumulative changes or slow onset environmental degradation are usually natural processes that are influenced and advanced by human activity.

Some 135 million people are threatened by severe desertification, while some 550 million people subject to chronic water shortages in developing countries (Myers 2001:610). Hardy expects that climate change will probably accelerate the crisis through 'desertification from tree removal, overgrazing and other detrimental land-use practices', especially in sub-Saharan Africa (2003:161). While Lonergan claims that:

'human-induced soil degradation is one factor which directly affects economic sufficiency in rural areas to water availability is another factor that may affect sustainable livelihoods... Do factors like water scarcity and human-induced soil degradation in and of themselves cause population displacement? The linkage is much more indirect; in most cases, one or more of rapid population growth, economic decline, inequitable distribution of resources, lack of institutional support and political repression are also present' (1998:50-52).

The discussion surrounding human impacts upon climate change is little understood, since such changes and consequences are very complex. It is not clear what is *natural* (except perhaps volcanic eruptions and earthquakes) and what is *human-made* or influenced (such as floods, droughts and hurricanes). Often human and natural factors may occur in conjunction with one another (Stojanov 2004). Moreover, because the types of migration (return, repeat, circular, permanent, and temporary) may be as varied as the intervening variables (socioeconomic status, migrant selectivity) and environmental outcomes (deforestation, fisheries depletion), it is very difficult to adequately assess these processes (Curran 2002).

Slow onset migration is normally caused by depletion of resources (land and water), deforestation, desertification and pollution (Black, 1998). This is further intertwined with poverty studies (Eriksen et al. 2007; ADB et al. 2003; McGuigan et al. 2002;



Richards 2002). As such, environmental-induced displacement is not a new phenomenon. Throughout history, people have been forced to leave their homes because the land on which they lived could no longer support them.

Small amounts of arable land per capita are typical in many regions of the global South (AAAS 2000; WDI 2002). Approximately 1.1 billion people in the world lack access to drinking water, including half the population of sub-Saharan Africa, one third of East Asia, and large numbers in Southeast Asia and the Pacific, Latin America, South Asia and the Middle East (UNDP 2000). The highest rate of deforestation in recent decades is reported to have occurred in Africa (0.8 per cent per year), with Asia and South America close behind (FAO 2001).

There is ample historical evidence to suggest that scarcity of land resources has led to waves of out-migration to new lands, such as occurred from Europe in previous centuries. Land scarcity has been a key driver of migration in Uganda (Tukahirwa 2002) and Nepal (Shrestha 1990). VanWey argues that both a lack of land, and a large amount of land, have motivated migration in Thailand and Mexico (2003; 2005). Henry et al. show that the risk of out-migration in Burkina Faso is higher in villages with unfavorable agroclimatic conditions than it is in villages with favourable ones. It is also lower in villages with increased water conservation technologies (2004). These effects usually apply to short-term migration, which supports the theory that this type of temporary migration is part of a strategy to diversify income sources in environments perceived of as risky.

Deforestation has displaced indigenous people in Ecuador, Cambodia and Brazil, among other places (Myers 1993; King 2006:542). Desertification has been recognised as one of the major causes of displacement and migration affecting almost 135 million people (Myers 1993; Almeria Statement 1994). As previously stated, the link to displacement is more complex than is often acknowledged. In some cases those said to be victims of desertification may also be the victims of land expropriation and eviction. In other cases displacement may be politically and/or economically motivated. This may be due to factors such as global agribusiness competition, imbalanced trade practices and government agriculture subsidies that have left small farmers unable to support themselves who are forced to leave their lands (Vine 2005:145)

Meze-Hausken emphasises the relationship between adaptation and migration in a case study which examined the dry-lands in Ethiopia. This research investigated how an individual becomes a 'climate migrant', concluding that to distinguish a climate migrant from a political migrant requires that the migrant personally perceives the climatic situation as the main, and often only, reason for migration (2000:382).

Agricultural production can also be adversely affected by massive deforestation, air pollution and climatic changes. Soil degradation and deforestation often go hand-in-hand. Although the loss of cropland as a result of soil degradation leads to forest clearance, the felling of trees further erodes land resources. Impoverishment of terrestrial ecosystems as a result of deforestation may manifest itself in a variety of ways, including accelerated soil erosion and nutrient depletion.

For example, according to some estimates Egypt is at risk of losing 12-15 per cent of its arable land, which given Egypt's expected increase in population by 2050, the anticipated rise in sea-level could displace more than 14 million people. In one region



of Shanghai, the Chinese government calculates that '30 million people may be displaced due to global warming impacts' (Stojanov 2004:8). A rising sea-level coupled with an increase of inland floods (from melting Himalayan glaciers) would affect an estimated 142 million inhabitants of India's coastal territories, as well as people from Bangladesh. Brown (2004) concludes that a rise in sea level of just one metre would inundate half of Bangladesh's rice land, forcing the relocation of at least 40 million people. Other delta areas at risk include Indonesia, Thailand, Pakistan, Mozambique, Gambia, Senegal and Suriname. Islands at risk would include the Maldives, Kiribati, Tuvalu, the Marshalls and some small islands in the Caribbean (Barnett and Adger 2003).

The IPCC predicts that the sea level may rise at a rate of 6 centimetres per decade on average over the next century. Clearly, a rise of this magnitude will severely affect the densely populated low-lying coastal zones of developing countries like China, Egypt and Bangladesh, as well as some island states (Curran 2002).

Since approximately 41 per cent of the world's population live within 100 km of a coastline, the importance of coastal zones and their sustainability are paramount. A rise in the sea level is likely to induce large-scale migration in the long term. According to Nicholls et al., by 2080 the flood risk for people living on islands will be 200 times greater because of global warming. Moreover, they conclude that up to 70 per cent of the world's coastal wetlands could be lost by 2080 (1999).

Brown (2004) provides numerous examples of environmentally-induced displacement. He states that 'some 400 to 600 Mexicans leave rural areas every day, abandoning plots of land too small or too eroded to make a living. They either migrate to Mexican cities or attempt the perilous journey to the United States. Another significant flow of 'environmental refugees' comes from Haiti, which is widely recognized as an ecological disaster. In China, where the Gobi Desert is growing by 10,400 square kilometres each year, the flow of refugees is swelling: the Asian Development Bank preliminary assessment of desertification in Gansu province has identified 4,000 villages that face abandonment (Brown 2004).

The loss of livelihoods and living space and as a result of environmental stress may lead to the migration of affected populations. The decision to leave home is often not a simple one. People generally choose to stay in their native land and struggle to overcome the impact of environmental disruptions as far as possible.

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## 4.2 Acute onset environmental degradation

It has become evident in recent years that the impacts of climate change will occur primarily through slow shifts in average conditions over a long period of time. This is likely to lead to elevated levels of extreme weather events (van Aalst 2006:7; IPCC 2001; Mirza 2003). Although there may be inconsistencies surrounding the validity of recent disaster data, the trend seems clear - especially in the global South. According to some commentators, some 141 million people lost their homes in 3,559 natural hazard events between 1980-2000. Over 97 per cent of these people lived in developing countries (Gilbert 2001:1).

These data do not include the impact of other recent disasters such as Hurricane Mitch and the tsunami in 2004. Almost 80,000 houses were destroyed or damaged by Hurricane Mitch in 1998, leaving some 300,000 Central Americans homeless. The Gujarat earthquake in India in January 2001 left almost one million families homeless. Moreover, during the 2000 floods in Mozambique, 700 people died and 550,000 had to be relocated from their homes (Christie and Hanlon 2001). The tsunami of 26 December 2004 hit the coastal communities of the Indian Ocean leaving



some 231,000 people dead or missing, and more than one million displaced in 12 countries. In October 2005, approximately 3.5 million people were affected in some way or another by the earthquake that occurred in the northern areas of Pakistan and India (Oxfam 2005; Rice 2005; Returns Task Force 2006). In August 2005, Hurricane Katrina devastated much of the north-central Gulf Coast of the United States, resulting in the temporary displacement of about 1.5 million people, of whom 300,000 will never return (Grier 2005). Occurring over a period of just 14 days, this represented the largest displacement of Americans in the country's history (Renaud et al. 2007:21).

The International Federation of Red Cross and Red Crescent Societies (IFRC/RCS) reports that between 1996 and 2005 the types of disaster which affected more people than any other were droughts/famines in Africa and Oceania (accounting for 86 per cent and 51 per cent of the disaster-affected population in Africa and Oceania respectively) and floods in Asia, the Americas and Europe (accounting for 57 per cent, 43 per cent and 38 per cent of the disaster-affected population respectively) (2006:217). As noted by King, the speed of displacement resulting from the immediate or gradual deterioration of the environment, as well as the potential for return to place of origin, might differentially affect the movement of people as they confront environmental stress and change (King 2006:545).

It seems evident that in deciding to migrate, environmental degradation works in concert with other factors. Consequently, risk reduction measures directed at the underlying macro-level causes of vulnerability should be integrated into development policy, and not only climate change adaptation strategies that seek to respond only to the ramifications of change (Schipper and Pelling 2006:27). Watson and Ackermann argue that the onset of climate change 'does not call for a different or new strategy', as problems created by climate change build on existing development problems (2000: 24).

Extreme weather conditions often result in disasters, resulting in policymakers turning their attention to questions regarding how people and societies can *adapt* to the risks posed by climate change and *prepare* for disasters (Helmer and Hilhorst 2006:1).

Moreover, developing our understanding of social-ecological systems shows that vulnerability is influenced by social-ecological resilience or 'the ability to absorb the shocks, the autonomy of self-organisation and the ability to adapt both in advance and in reaction to shocks' (Adger 2006:269). For example, the impact and subsequent recovery from the Asian tsunami of 2004, or the ability of small islands to cope with weather-related extremes, may demonstrate how discrete events in nature expose underlying vulnerability and push systems into new domains where resilience may be reduced (Adger et al. 2005). A recent study on tsunami migration in Sri Lanka showed that households particularly affected by the tsunami, together with households with negative experiences of the ocean prior to the tsunami, were more likely to migrate than others:

'Having relatives at a possible new place as well as having received financial and/or material support like tents or tools also both have a "pushing" impact on the household's decision to leave the area. This implies that most current support schemes encourage people to leave the high-risk areas' (Grote et al. 2006:1).

In Sri Lanka, and to a lesser extent in Aceh, exclusion zones for coastal redevelopment were created as protective environmental measures in an effort to

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avoid recreating tsunami vulnerability. These were subject to arbitrary and inconsistent changes, which meant that many new transitional settlements were built but without clear plans for permanent settlement and shelter, since the coastal land available for permanent settlement was not clearly allocated (Kennedy et al. 2007:28; INFORM Human Rights Documentation Centre 2005; Oxfam 2005).

While exclusion zones generally reduce the impacts of future tsunamis and other coastal floods, a failure to conduct proper assessments of new sites has increased the level of exposure to other hazards, damaging livelihoods and creating 'compulsory inland villagisation' of almost 60,000 people (Boano 2007).

Research into climate change and disaster risk have tended to be treated separately due to uncertainty about how they might be linked. With more recent scientific evidence making such links clearer, policymakers have begun to realise the importance of addressing disaster risk, while also diminishing the impacts of climate change through vulnerability reduction. The scholarly realms of disaster risk and climate change are also beginning to merge.

Thus, a new approach is needed to underpin the incorporation of risk management into work on climate change and the introduction of climate change into natural hazards and development planning. Such an approach should be one that is capable of dealing with the long-term transformations that climate change may bring and the ways in which people respond at the national, regional and local level. The key concepts of this new approach should be vulnerability, adaptation and resilience. As noted by O'Brien et al., comprehensive risk management (as it has evolved in the field of natural hazards planning over the past 20 years) provides the basis for such a new paradigm (2006:74). A conceptual bridge exists between, on the one hand the shared understanding of risk as a function of hazard and vulnerability, and on the other hand the conceptual and practical overlap between notions of *vulnerability* and *resilience*.

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## 5. Environmental degradation and conflicts

### 5.1 Linking climate change, migration and conflict

Establishing concrete links between climate change and conflict is far from easy. Much of the literature on environmental conflicts is more theoretically than empirically driven, and not informed by solid empirical research (Barnett 2000; 2003; Gleditsch 1998). Despite a general call from many scholars for further research, as Baechler argues there is a need for more elaborate case studies which are linked with other studies on conflict that also deal specifically with issues such as poverty, ethnicity and the state (1999a:108).

Nonetheless, the security threat posed by climate change has been debate increasingly in recent years, largely based on secondary and politicised sources. For instance, in April 2007 the British Foreign Secretary, Margaret Beckett, argued that the impacts of climate change ‘went...to the very heart of the security agenda’ (UN 2007). Former UN Under-Secretary-General for Humanitarian Affairs, Jan Egeland, and Secretary-General Ban Kimoon have both linked the conflict in Sudan’s Darfur region to climate change and have further argued that similar environmental



problems are increasingly causing violence in other African countries (Ban 2007). A number of NGOs have supported this line of argument. Christian Aid has warned that 184 million people could die in Africa alone as a result of climate change before the end of the 21st century and that 'at least one billion people will be forced from home as the effects of climate change deepen an already burgeoning global migration crisis' (2006; 2007). Despite ambiguity in the research concerning environmentally-induced conflict, there appears to be a general consensus that direct links exist between environmental change and violent conflict. However, it has not been shown that environmental factors alone lead to conflict (Homer-Dixon and Blitt 1998).

The IPCC deviates from this mainstream point of view, suggesting that there are in fact very few concrete links between climate change and violent conflict. They do acknowledge, however, that climate-related migration may increase the risk of political instability and conflict (IPCC 2001:85). This is underscored in their analysis of hydrology and water resources in which they suggest a 'potential for international conflict (hot or cold) over water resources' (IPCC 2001:225). Reduced water availability may induce conflict between different users. Specifically, the report refers to the availability of water in the semi-arid savannah ecosystems of tropical Africa, which could exacerbate conflicts between herdsman and farmers (IPCC 2001:394). Present agreements about water allocations in absolute terms may create conflicts in the future if the total amount of water available is reduced (IPCC 2001:225). The report further suggests that the fishing industry faces possible adverse effects of climate change. It is clear that fish reserves are among the most important economic resources in many countries and fish stocks are a trans-boundary resource (IPCC 2001:369f)

The influential and widely publicised Stern Review(2007), which was commissioned by the British government to examine the economics of climate change, refers to how conflict *may* arise under certain circumstances. This report argues that some 200 million people may be displaced by 2050. Other factors such as poverty and inequities between groups, the availability of weapons, ethnic tensions, external indebtedness, institutional resilience, state legitimacy and its capacity and willingness to intervene may matter as much (if not more) than environmental change (Baechler 1999b).

Importantly, it has been argued that environmental factors do not (and are not likely to) trigger open conflict between nation-states (Baechler 1999b; Homer-Dixon and Percival 1996; Wolf 1999). Conflicts in which environmental change appears to be a contributing factor tend to be within, rather than between, states. It is more at this sub-state level that climate change presents itself as a principle factor.

Academic literature on the subject conveys an uncertainty about the extent to which—and in what ways—poverty and inequality are factors in violent internal conflicts (Boyce et. al. 1999; Gleditsch 2001). Most researchers agree that relative and absolute poverty are important variables, however Collier (2000) argues that this is less to do with resistance to poverty per se, and more to do with the way inequality can be discursively used to mobilise large numbers of people.

Throughout the 1990s academics argued that a scarcity of renewable environmental resources can contribute to violent conflicts within states (Baechler 1999a; Homer-Dixon 1991; 1999; Kaplan 1994). The connection between environmental change and internal conflict, if they exist at all, are far more complex than a simple climate



change—scarcity— conflict formulation. It has recently been argued that the abundance of natural resources, rather than their scarcity, drives conflict (Collier 2000; de Soysa 2001). Using statistical modelling, de Soysa and Collier both found that scarcity of renewable resources cannot be correlated to political instability or ethnic diversity. The issue is, therefore, not about competition over scarce resources, but rather competition to gain dominant control over substantial income generating resources or more equitable access to the spoils of resource extraction.

## 5.2 The causal chain

Much of the literature is based on the presumption that climate change results in a reduction of essential resources for livelihood, such as food or water. This may have one of two consequences: those affected by the increasing scarcity may start fighting over the remaining resources; or people may be forced to leave the area by fleeing across and international border or becoming internally displaced. When the migrants encroach on the territory of other people, who may also be resource constrained, the potential for conflict and violence rises (Nordas and Gleditsch, 2007:5).

Barnett and Adger (2007) reviewed a broad range of studies, focusing particularly on countries where a large majority of the population is still dependent on employment in the primary sector. If climate change results in reduced rainfall and access to the natural capital that sustains livelihoods, poverty will be more widespread. This may lead to increased grievance and recruitment opportunities for rebel movements. Raleigh and Urdal (2007) found that environmental and demographic variables have a moderate-to-low effect on the risk of civil conflict, but local freshwater scarcity significantly increases the risk of conflict.

Barnett and Adger (2007), and especially Reuveny (2007), emphasise that migration may lead to conflict in host communities. Indeed, several studies cite Bengali immigration from the plains into the Chittagong Hills and Assam as an example of this. Suhrke argues that this case is unique and that there is in fact no systematic evidence for a general link between migration and conflict (1997: 257f). Migrants may also be valued for their skills and for their contribution to cultural variability. A study by Salehyan and Gleditsch (2006) indicates that most countries with an influx of refugees since the 1950s have remained peaceful.

Reuveny (2007) examined 38 cases of conflict in Asia, Africa, and Latin America. Half of these he classifies as 'no conflict'. In 19 cases, environmental pressures are clearly mixed with inter-ethnic violence that predates migration, and in some cases (El Salvador and Guatemala specifically) violence was probably escalated by the ideological tensions of the Cold War and therefore fuelled by outside powers. In the absence of a multivariate analysis, it is difficult to conclude how much of this violence contributed to decisions to migrate. Many of these cases exhibit mostly 'unorganized violence' and do not register in mainstream compilations of armed conflicts. Underdevelopment, dependence on the environment for livelihoods, high population density and income inequality are also significant factors.

'9 of the 38 cases analyzed involved intrastate migrations, 6 cases involved interstate migrations, and 13 cases both. The highest number of migrants per episode occurred in Bangladesh (12-17 million), followed by the Sahel (10 million), Brazil (8 million),



Philippines (4.3 million), Sudan (3.5-4 million), and Somalia (2.8 million), none of which in the Global North' (Reuveny 2007:7).

Furthermore, Nyong, Fiki and McLeman (2006) found that drought conflicts in the Western Sahel are increasing and that climate change could exacerbate such conflicts. However, in another study of 27 communities in Northern Nigeria, the same authors argue that the use of traditional institutions in conflict management can moderate such conflicts.

The debate over the causal chain of environmental effects on conflict is ongoing. Climate change will certainly have a plethora of different outcomes. Human livelihoods could be affected directly through factors ranging from a rise in sea levels, human health and changing weather patterns, and indirectly via factors such as migration. These various causal chains need to be mapped and investigated.

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## 6. Emerging concepts in the debate

Concepts of resilience, vulnerability and adaptation are increasingly important in the study of human dimensions of global environmental change. Recent disastrous events such as Hurricane Katrina, the Southeast Asian tsunami and the Pakistan earthquake, dramatically illustrate the potential vulnerability of human society to climatic and environmental variability and change. While these concepts are not new and used in different stream of research and activities, they are becoming more important within the research community examining global climate change (Janssen and Ostrom 2006:237). This part of the research guide aims to introduce readers to key definitions and key literature.

### 6.1 Vulnerability

The concept of 'vulnerability' has been employed by different research traditions. In the recent past it has emerged as a cross-cutting theme in examining the human dimensions of global environmental change, despite the lack of consensus with regard to its meaning. Depending on the research area, it has been applied to the societal, ecological, natural or biophysical subsystems. It has also been defined as 'a multi-layered and multidimensional social space defined by the determinate political, economic and institutional capabilities of people in specific places at specific times' (Bohle, Downing and Watts 1994:39).

Adger examines the evolution of approaches to assess vulnerability, arguing that vulnerability to environmental change does not exist in isolation from the wider political economy of resource use. It is in fact 'driven by inadvertent or deliberate human action that reinforces self-interest and the distribution of power in addition to interacting with physical and ecological systems' (2006:270).

The risk-hazard approach - the most classical approach to vulnerability - is useful in assessing risks to important elements that arise from exposure to hazards of a particular type and magnitude. This approach, which is most widely applied in the technical literature on disasters, sees vulnerability primarily with regard physical systems related to infrastructure and other constructed environments. This focus has led to some authors treating vulnerability as simply 'exposure to hazards' (Hewitt 1997:27) or as 'being in the wrong place at the wrong time' (Liverman 1990).

A key aspect of the risk-hazard approach is the clear distinction between two factors which determine the risk itself: the *hazard*, which is 'a potentially damaging physical event, phenomenon or human activity [that] is characterized by its location, intensity, frequency and probability; and the *vulnerability*, which denotes the relationship between the severity of hazard and the degree of damage caused (UN 2004; Füssel 2007:159).



### Distinct approach on vulnerability

Building on this classical approach, there are other distinctive approaches, from different vantage points, which shed light on the multi-dimensional space of vulnerability:

- *Human ecology perspective* refers to the relationship between nature and society, which is conceived of as a way to understand both the risk environment that vulnerable groups confront and the ‘quality of their resource endowments’ (Bohle, Downing and Watts 1994:39). From this perspective, Cutter et al. (2003), classify research into first, vulnerability as exposure (conditions that make people or places vulnerable to hazard); second, vulnerability as social condition (measures resilience to hazards); and third, “the integration of potential exposures and societal resilience with a specific focus on places or regions’ (Cutter et al. 2003:243). While O’Brien et al. (2004) identify similar trends in ‘vulnerability as outcome’ and ‘contextual vulnerability’ as two opposing research foci and traditions (Kelly and Adger 2000).
- *Expanded entitlements perspective* derives mainly from the work of Sen (1981) and focuses almost exclusively on the social realm of institutions, well-being, social status and gender as important variables. Vulnerability research on natural hazards aims to develop an integral understanding of environmental risks alongside human responses by drawing on geographical and psychological perspectives in addition to evaluating the social parameters of risk (Adger 2006:269).
- *Political economy perspective* refers to ‘particular resource endowments and patterns of entitlements [that] are always embedded in a macro-structure provided by political economy’ (Bohle, Downing and Watts 1994:39). Implicit in this approach is the definition of political economy that sees specific configurations of class processes in relation to crisis tendencies as important in grasping the specific risks and threats experienced by vulnerable groups.

In the *human ecology tradition*, there is a shift away from dominant engineering approaches to hazard management. The human ecology tradition aims to engage with the political and structural causes of vulnerability within a society, and attempts to explain why the poor and marginalized have historically been most at risk as a result of natural hazards. In this tradition, Cutter defines vulnerability as ‘the likelihood that an individual or group will be exposed to and adversely affected by a hazard. It is the interaction of the hazards of place with the social profile of communities’ (1993).

In the context of food insecurity, the World Food Programme sees ‘vulnerability as being composed of two principal components, namely: risk of exposure to different types of shocks or disaster event and ability of the population to cope with different types of shock or disaster event’ (2004). While Turner et al. suggest a place-based conceptualisation of vulnerability that comprises exposure, sensitivity and resilience, seeking to analyse the elements of vulnerability in a bounded system in a particular spatial scale (2003).

In contrast, the *political economy approach* focuses its analysis on people, defining vulnerability as ‘the state of individuals, groups or communities in terms of their ability to cope with and adapt to any external stress placed on their livelihoods and well-being. It is determined by the availability of resources and, crucially by the entitlement of individuals and groups to call on these resources’ (Adger and Kelly

27



1999). This approach is found primarily in poverty and development literature in which vulnerability refers exclusively to people, and is based on an explanatory model of socioeconomic vulnerability to multiple stresses.

Blaikie and colleagues bridged these two traditions of hazard research (1994). They proposed that physical or biological hazards represent one pressure and characteristic of vulnerability. As such, a further pressure comes from the cumulative progression of vulnerability, from root causes through to local geography and social differentiation. Their disaster pressure-and-release model starts from the risk-hazard framework, viewing risk as the product of hazard and vulnerability (Blaikie et al. 1994; Wisner et al. 2004). This model presents an explanation of vulnerability that highlights global root causes, regional pressures and local conditions. It further prescribes actions and principles towards recovery from and mitigation of disasters that focuses explicitly on reducing vulnerability.

Adger suggests that an approach centred around a sustainable livelihoods and vulnerability to poverty might be understood as a successor to a model based upon vulnerability as entitlement failure (2006:272). This research tradition, largely found in development economics, tends not to consider integrative social-ecological systems. Instead conceptualisation and measurement of the links between risk and well-being are examined at an individual level (Alwang et al. 2001; Collinson 2003; Adger and Winkels 2006).

Crucially, sustainable livelihood refers to the well-being of persons or households. It comprises the capabilities, assets and activities that lead to well-being (Chambers and Conway 1992; Ellis 2000). Vulnerability in this context refers to an individual's susceptibility to circumstances, resulting in the person being unable to sustain a livelihood. As such, these concepts are most often applied in the context of development assistance and poverty alleviation. While livelihoods themselves are conceptualized as stemming from capital assets that include ecosystem services (natural capital), the physical and ecological dynamics of risk remain largely unaccounted for in this line of research. Indeed, sustaining and strengthening livelihoods has become central in the debate around poverty reduction raising issues of vulnerability.

The dominant framework for much of the livelihoods analysis is the 'sustainable livelihoods approach' (Collinson 2003). This approach focuses on people's assets (tangible and intangible), their ability to withstand shocks, as well as policies and institutions that are viewed to reflect poor people's priorities. Moreover, Twigg (2003) believes that focusing on the extent and nature of poor people's livelihood assets, in addition to their vulnerability to hazards and other external forces, should make it possible to identify entry points for protecting those assets that are most at risk, or ones that could be most valuable during a crisis.

### **Climate change and vulnerability**

Research on vulnerability, when applied to the issue of the impacts and risks of climate change, demonstrates the full range of research traditions, while contributing in a significant way to the development of newly emerging systems vulnerability analysis. Climate change represents a multi-scale problem on a global level that is characterised by diverse actors and multiple stressors and timescales. It has been acknowledged that exposure to multiple stressors is a significant concern, particularly



in developing countries where food security is influenced by political, economic and social conditions in addition to climatic factors.

The IPCC (McCarthy et. al., 2001) defines vulnerability as:

‘the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity’.

In this context, vulnerability to climate change is therefore understood as a characteristic of a system and a function of exposure, sensitivity and adaptive capacity. Thus, vulnerability could be considered the flip side of resilience: when a social or ecological system loses resilience it becomes vulnerable to change that previously could be absorbed (Kasperson and Kasperson, 2001). In a resilient system, change has the potential to create opportunity for development, novelty and innovation (Folke, 2006).

Each of these research traditions, with their multidimensionality and the richness of different perspectives, contribute towards framing vulnerability to global change. They demonstrate that institutions adapt to environmental risk or, as argued by (Adger, 2006:273), “given resources and favourable circumstances, this adaptation will ultimately reduce the impact of perturbations on marginal sections of society and enhance resilience”. This points to a close interdependence between environmental risk, the political economy of development, and the resilience of systems. In this regard, a stream of studies on institutions and social capital has recently emerged (Pelling and Hight, 2005; Schipper and Pelling, 2006).

Moreover, as noted by Füssel (2007), standard applications of disaster risk assessment are “primarily concerned with short-term (discrete) natural hazards, assuming known hazards and present (fixed) vulnerability”(Downing et al., 1999) in which the risk to system is fully described by two risk factors: hazard and vulnerability. In contrast, key characteristics of anthropogenic climate change are that it is long-term and dynamical, it is global but spatially heterogeneous, it involves multiple climatic hazards associated with uncertainty. Moreover, it is attributable to human action, requiring a dynamic assessment framework that accounts for changes in all vulnerability factors over time. Hence, any “conceptualization of vulnerability to climate change needs to consider the adaptive capacity of the vulnerable system, which largely determines how its sensitivity evolves over time” (Füssel, 2007).

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### 6.3 Resilience

The resilience perspective is increasingly used as an approach to understanding the dynamics of social–ecological systems and as such it aims to describe, in a metaphorical sense, ‘the condition of systems that undergo stress and have the ability to recover and return to their original state’ (Sapountzaki 2007).

This perspective emerged from ecology in the 1960s and early 1970s and, in particular, from the writings of Holling. ‘Resilience’, as he saw it, ‘determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables and driving variables and still persists’ (1973).

According to Resilience Alliance, resilience is ‘the ability to absorb disturbances, to be changed and then to re-organise and still have the same identity (retain the same basic structure and ways of functioning). It includes the ability to learn from the disturbance’. Fundamentally, this definition represents a shift away from a purely growth and efficiency perspective towards a focus on recovery and flexibility. Growth and efficiency alone can often lead ecological systems, businesses and societies into fragile rigidities, exposing them to turbulent transformation. However, ‘learning, recovery and flexibility open eyes to novelty opportunity’.

Crucially, this dynamic process has influenced fields outside ecology, including anthropology, ecological economics, non-linear dynamics and the modelling of complex systems of humans and nature (Costanza et al. 1993) as well as, most recently, disaster management (Davis 2003; Davis and Izadkhah 2006; Pelling 2003; UNISDR 2005) as well as other social sciences (Davidson-Hunt and Berkes 2003).

Adger (2000) defined social resilience as the ability of human communities to withstand external shocks to their social infrastructure, whereas Anderies et al. (2004) used the concept of robustness to convey the maintenance of certain desired characteristics of a system despite potential fluctuations in the behaviour of its components or its environment. Resilience however is not only concerned with persistence or robustness in the face of a disturbance. It is also about the



opportunities that such a disturbance can open up, specifically in terms of a recombination of evolved structures and processes, renewal of the system and the emergence of new trajectories. In this sense, resilience provides 'adaptive capacity' (Smit and Wandel 2006) that allows for continuous development - a dynamic interplay between sustaining and developing with change. In a similar vein, adapting this concept to urban disasters and influenced by the work of Kendra and Wachtendorf (2002), Davis and Izadkhah (2006:19) argue that a resilient system is not possible if 'any of robustness, redundancy, resourcefulness and rapidity is missing from an overall strategy'.

As such, there have been attempts to address social resilience in relation to coastal communities (Adger 2000), the vulnerability of cities (Pelling 2003) and to patterns of migration (Locke et al. 2000). This work has been inspired by the adaptive cycle to understand management institutions and theories of social change (Holling and Sanderson 1996), famine and to assess the vulnerability of food systems (Fraser et al. 2005).

The UN International Strategy for Disaster Reduction (UN/ISDR) has also adopted the term resilience. With particular reference to natural hazards, it defines the term as:

*'[...] the capacity of a system, community or society to resist or to change in order that it may obtain an acceptable level in functioning and structure. This is determined by the degree to which the social system is capable of organizing itself and the ability to increase its capacity for learning and adaptation, including the capacity to recover from a disaster' (UN/ISDR 2005:23).*

IFRC/RCS, (2004) definition invokes Wildavsky (1991) who saw resilience as 'the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back' and acknowledged resilience at the individual level being 'a common characteristic of all human beings', whilst at the same time, arguing that:

*'[...] in the last two decades resilience has become the buzz word to describe the capacity to survive, adapt and bounce back – applied freely to anything from ecosystems to business at any level from households to global communities' (IFRC/RCS 2004:21).*

The *World Disasters Report* (IFRC/RCS, 2004) acknowledges the strengths and assets of resilience in relation to risks seen in the sustainability approach. This has become an important organizing framework for the efforts of a wide range of multilateral agencies, NGOs and governmental bodies.

In this perspective, such risks and disasters are part and parcel of a wider development context and framework. Livelihoods are seen as being threatened not only by natural hazards, but also by environmental change, social discrimination, unaffordable credit or misguided government policies. Therefore, attempts to increase community resilience must consider a complex range of risks.

### **Resilience and migration**

According to Adger (2000) mobility and migration are another set of important indicators of resilience. However, resilience or changes in resilience cannot simply be inferred from the presence or absence of migrants in a given region or community, the degree of labour mobility or a change in a total population over time. Significant



population movement can be evidence of instability or alternatively it could be a component of enhanced stability and resilience, depending on the *type* of migration. Displacement may be caused by a deleterious state of affairs in the home locality (such as loss of assets) and often has negative impacts on social infrastructure in both sending and receiving areas.

Where migration is circular in nature and stimulated by the pull factors such as economically attractive urban areas, resource flows associated with remittances can often enhance resilience. Migration, whether 'voluntary' (with the possibility of return) or in the form of displacement, has both economic and social dimensions. The most important aspect of population movement in the context of indicators of stability and resource dependency is that of migration as a strategy for risk spreading at the household level, as well as the relationship of such migration to resource dependency.

In the face of significant external stress, population displacement is often an indicator of the breakdown of social resilience. In the food security literature, for example, displacement and coping strategies represent an extreme manifestation of vulnerability (Watts and Bohle 1993). These coping strategies tend to be short-term adjustments and adaptations to extreme events. They are usually involuntary and almost invariably lead to another subsequent state of vulnerability to future famine situations (Adger 2000:357). In the context of Africa, such coping strategies are postulated by Corbett (1988) to be strategies primarily concerned with maintaining future household income-generating capacity, rather than maintaining current consumption.

Evidence presented by Jodha (1975) from Rajasthan in India shows that the objectives of farmers' adjustment mechanisms in the face of food insecurity are to protect the assets and the sources of future income, rather than current consumption. Interventions based on increasing consumption in such situations may 'prove self defeating and contribute to the process of pauperization initiated and accentuated by recurrent droughts' (1975: 1619).

Despite the vagueness of the term resilience, and continuing doubts about appropriate ways to promote it, there seems to be an agreement that local resilience is a people-centred and developmental way of approaching relief, recovery and disaster risk reduction. Although it tends not to be explicitly stated in the literature, it may be implicitly inferred that resilience is concerned with constant manoeuvring and trade-offs between various forms of risk-taking and social development (Sapountzaki 2007).

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## 6.4 Adaptation

People’s adaptation to environmental change has been a focus of anthropology since the early 1900s. In the 1990s, scholars began to use the term ‘adaptation’ in reference to the study of the consequences of human-induced climatic change. IPCC defines adaptation as ‘adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. This term refers to changes in processes, practices, or structures to moderate or offset potential damages or to take advantage of opportunities associated with changes in climate. It involves adjustments to reduce the vulnerability of communities, regions, or activities to climatic change and variability’ (McCarthy et al. 2001:643).

Smit and Wandel (2006) have examined the concept of adaptation and adaptive capacity in the context of vulnerability on human systems to climate change. In their view, adaptation refers to:

‘a process, action or outcome in a system (household, community, group, sector, region, country) in order for the system to better cope with, manage or adjust to some changing condition, stress, hazard, risk or opportunity’ (Smit and Wandel 2006:282).

Brooks(2003:8) describes adaptation as ‘adjustments in a system’s behavior and characteristics that enhance its ability to cope with external stress’. In the climate change context, Smit et al. argue that adaptation refers as ‘adjustments in ecological socioeconomic systems in response to actual or expected climatic stimuli, their effects or impacts’ (2000:225). Pielke defines adaptations as the ‘adjustments in individual groups and institutional behaviour in order to reduce society’s vulnerability to climate’ (1998:159). Adaptations may be anticipatory or reactive, and can be autonomous or planned - depending on the degree of spontaneity (Fankhauser et al. 1999; Smit et al. 2000).

Adaptability is closely related to resilience. It involves the capacity of actors in a system to influence resilience, which is an outcome of an individual’s and group’s ability to manage a system or ‘capacity to create a fundamentally new system when ecological, economic, or social (including political) conditions make the existing system untenable’ (Walker et al. 2002). Elsewhere, adaptive capacity has been defined as ‘the ability of a socio-ecological system to cope with novel situations without losing options for the future’ (Folke and Carpenter 2002).



Thus, adaptive capacity can be viewed as the ability of a social-ecological system to cope with novel situations without losing options for the future, and resilience is key to enhancing adaptive capacity. Adaptive capacity in ecological systems is related to genetic diversity, biological diversity and the heterogeneity of landscape mosaics (Carpenter et al. 2001). In social systems, the existence of institutions and networks that learn and store knowledge and experience, create flexibility in problem solving and balance power among interest groups that play an important role in adaptive capacity (Scheffer et al. 2001, Berkes et al. 2002).

Systems with high adaptive capacity are able to re-configure themselves without significant declines in crucial functions in relation to primary productivity, hydrological cycles, social relations and economic prosperity. A consequence of any loss of resilience, and therefore of adaptive capacity, is the loss of opportunity, constrained options during periods of re-organisation and renewal, and an inability of the system to do different things.

Adaptive capacity is context-specific and varies from country to country, from community to community, among social groups and individuals, and over time. It varies not only in terms of its value, but also according to its nature. The scales of adaptive capacity are not independent and as such the capacity of a household to cope with climate risks depends to some degree on the enabling environment of the community, and the adaptive capacity of the community is reflective of the resources and processes of the region (Smit and Pilifosova 2003).

Most communities and sectors can cope with (or adapt to) normal climatic conditions and moderate deviations from the norm. But exposure to extreme events often lies outside the capacity of individuals and communities to cope. Consequently, some authors apply 'coping ability' to short term capacity - or the ability to simply survive - and employ 'adaptive capacity' for longer term, more sustainable adjustments (Vogel 1998).

Research in South Asia, among other places, provides some insight into the crucial role played by numerous factors in livelihood resilience and adaptive capacity at the household and regional level in drought and flood affected areas. Such factors include: diversification, human mobility (migration and commuting), transportation, financial and communication systems, resilient 'adaptive' infrastructure, institutional systems, secure water supplies and natural resource conditions (Moench and Dixit 2004; Wisner and Blaikie et al. 2004).

Experience has shown that adaptation practices can be highly effective. These might include practices that modify some existing resource management strategy (e.g. water conservation in the Cook Islands), livelihood enhancement initiatives (e.g. income diversification in Bangladesh), disaster preparedness planning (e.g. flood or hurricane warning and planning in coastal Vietnam) or sustainable development program (e.g. land management alternatives in central Mexico) (Smit and Wandel 2006:289).

Using examples from drought in Gujarat, floods in Uttar Pradesh and Nepal, and water scarcity in Yemen, Moench (2005) highlights a variety of factors that enable and constrain effective adaptation to climatic variability. In virtually all situations, livelihood diversification represents a central element in the adaptation process. This is particularly the case where local opportunities for diversification are limited. The



cases studies explored demonstrate that diversification was often achieved by proactive migration or commuting strategies. As other studies have shown in regions as diverse as Asia, Africa and the Arctic, migration often is not usually an immediate function carried out under duress as a consequence of disaster, but rather is often a proactive diversification strategy (Berkes and Jolly 2001). The ability to diversify in this manner, and also through the development of non-agricultural activities in home locations, depends in turn on access to financial resources, communications systems, transport infrastructure, social networks, education and information. In most situations, adaptive capacity within home locations depends heavily on a combination of local factors and external linkages.

In analysing the case of coastal risks management in Vietnam, Adger (2000:754) argues that 'state institutions and civil society both facilitate adaptation to social and environmental change'. He builds upon the notion, purported by Blaike et al. (1994), that political and social change interact with economic determinants of vulnerability.

With specific emphasis on the relationship between adaptation and migration, Meze-Hausken explore a case study of the drylands in Ethiopia, investigating how an individual becomes a 'climate migrant'. 'Distinguishing a "climate migrant" from a political migrant demanded that the former migrant himself personally perceived drought or the climatic situation as the main, and often only reason for migration' (2000:382). The research demonstrates that at the beginning of a drought not all members of a society are equally vulnerable:

'differentiation in farming yield is little in times of drought, as almost all farmers cultivate in a similar ecological setting, with little irrigation and similar technology. It is a combination of different socio-economic and environmental indicators such as animal holdings, non-agricultural income or remittances, which determines how soon problems of food shortage may begin after a scarcity of rain. Nevertheless, after a certain number of months absolute limits appear, manifested through critical food- and water deficiency, reducing the primary difference in vulnerability between households. When such a threshold was exceeded during past droughts, options in coping with the crisis disappeared, making peasant farmers, regardless of their socio-economic point of departure, equally affected and forcing many of them to migrate' (Meze-Hausken 2000:401).

### **Vulnerability, resilience and adaptation: a multidisciplinary framework**

This research guide's brief exploration of the major literature - focussing on the concepts of vulnerability, resilience and adaptation - makes it clear that local initiatives to enhance livelihoods and hence adaptive capacity, may be constrained or even nullified by broader social, economic and political forces that shape local vulnerabilities. This raises questions about the relationship between adaptation and development, and the role of local initiatives in relation to 'transformations of geo-political-economic systems' (Adger 2006)

Ultimately, insights from emerging interdisciplinary conceptualisations of vulnerability and resilience demonstrate the co-evolutionary nature of social and natural systems: resilient ecosystems and resilient societies can better cope with external physical, as well as socio-political, stressors. Policies and strategies that reduce vulnerability and promote resilience can change the status quo for many agencies and institutions but are frequently resisted. Greater knowledge and understanding of vulnerability,



resilience and adaptation might provide some helpful insight to decision-makers (Kasperson and Kasperson 2005).

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- **Development and Climate Project** - [www.developmentfirst.org](http://www.developmentfirst.org)
- **Eldis – Climate Change Adaptation** - <http://www.eldis.org/go/topics/dossiers/climate-change-adaptation>
- **International Institute for Sustainable Development (IISD)** - <http://www.iisd.org/security/es/resilience/climate.asp>
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- **Stockholm Environment Institute** - <http://www.sei.se/risk/overview.html>
- **United Nations Development Programme (UNDP) - Programming Climate Change Adaptations** - <http://www.undp.org/gef/adaptation/index.htm>
- **United Nations International Strategy for Disaster Reduction** - <http://www.unisdr.org/isdrindex.htm>

## 7. Resources

### 7.1 Websites

- **Adephi Reseach** - <http://www.adelphi-research.de/>
- **Benfield UCL Hazard Research Centre** - [http://www.benfieldhrc.org/rea\\_index.htm](http://www.benfieldhrc.org/rea_index.htm)
- **Development and Climate Project** - [www.developmentfirst.org](http://www.developmentfirst.org)
- **Center for Unconventional Security Affairs, at the University of California, Irvine** - <http://www.cusa.uci.edu/>
- **CICERO – Center for International Climate and Environmental Research** - [http://www.cicero.uio.no/index\\_e.asp](http://www.cicero.uio.no/index_e.asp)
- **Climate Change Knowledge Network** - <http://www.cckn.net/va.asp>
- **Disaster Diplomacy** - <http://www.disasterdiplomacy.org>
- **Eldis – Climate Change Adaptation** - <http://www.eldis.org/go/topics/dossiers/climate-change-adaptation>
- **EM-DAT: the International Disaster Database** - <http://www.em-dat.net/>
- **Environmental Change and Security Program (ECSP)** - [http://www.wilsoncenter.org/index.cfm?fuseaction=topics.home&topic\\_id=1413](http://www.wilsoncenter.org/index.cfm?fuseaction=topics.home&topic_id=1413)
- **Environmental Change Institute (ECI) Oxford University Centre for the Environment** - <http://www.eci.ox.ac.uk/>
- **Environmental Conflict and Cooperation Platform** - <http://www.ecc-platform.org/>
- **Global Environmental Change and Human Security (GECHS)** - [www.gechs.org](http://www.gechs.org)
- **IDS – Institute of Development Studies** - <http://www.ids.ac.uk/ids/pvty/ClimateChange/index.html>
- **International Organization for Migration (IOM)** - <http://www.iom.int>



- International Human Dimensions Programme on Global Environmental Change (IHDP) - [www.ihdp.org](http://www.ihdp.org)
- Intergovernmental Panel on Climate Change - <http://www.ipcc.ch/>
- International Crisis Group – Climate Change and Conflicts - <http://www.crisisgroup.org/home/index.cfm?id=4932#one>
- Inter-American Institute for Global Change Research (IAI) - <http://www.iai.int/>
- IDRC on the Climate Change Adaptation in Africa (CCAA) program - [http://www.idrc.ca/en/ev-94424-201-1-DO\\_TOPIC.html](http://www.idrc.ca/en/ev-94424-201-1-DO_TOPIC.html)
- ID 21 - Communicating Development Research – Climate change resources <http://www.id21.org/zinter/id21zinter.exe?a=l&w=a3>
- IOM – Environment and migration research website - <http://www.iom.int/jahia/Jahia/pid/1824>
- International Displacement Monitoring Centre (IDMC) - <http://www.internal-displacement.org/>
- International Institute for Sustainable Development (IISD) - <http://www.iisd.org/security/es/resilience/climate.asp>
- International Institute for Environment and Development/ Climate Change - <http://www.iied.org/CC/index.html>
- Institute for environmental Security - <http://www.envirosecurity.org/>
- Linking Climate Adaptation Network - <http://www.linkingclimateadaptation.org/>
- Liser Foundation - Living Space for environmental refugees - <http://www.liser.org/>
- Living on Earth – environmental refugees - <http://www.loe.org/shows/segments.htm?programID=05-P13-00043&segmentID=2>
- Livelihoods Connect - <http://www.livelihoods.org/>
- Potsdam Institute for Climate Impact & Research (PIK) - <http://www.pik-potsdam.de>
- Provention Consortium - <http://www.proventionconsortium.org>
- Rapid Climate Change Project - <http://www.rcc.rures.net/>
- Red Cross/Red Crescent Centre on Climate Change and Disaster Preparedness - <http://www.climatecentre.org>
- Refworld Migrants / Environmental migrants - <http://www.unhcr.org/cgi-bin/texis/vtx/refworld/rwmain?page=topic&skip=0&toaid=4565c22541&toaid=4565c25f4e5>
- Resilience Alliance – Research on resilience in social-ecological systems - <http://www.resalliance.org/1.php>
- Reliefweb – [www.reliefweb.int](http://www.reliefweb.int)
- Stanford University Global Climate & Energy Project (GCEP) - <http://gcep.stanford.edu>
- Stockholm Environment Institute - <http://www.sei.se/risk/overview.html>
- The Conflict Resolution Information Source- <http://www.crinfo.org/action/browse.jsp?nid=2290>
- Tyndall Centre for Climate Change Research - [www.tyndall.ac.uk/](http://www.tyndall.ac.uk/)
- Understanding Katrina: Perspectives from the Social Sciences – <http://understandingkatrina.ssrc.org/>
- United Nations Environment Programme (UNEP) - <http://www.unep.org>
- United Nations University Institute for Environment and Human Security (UNU-EHS) - <http://www.ehs.unu.edu/>
- United Nations Framework Convention on Climate Change (UNFCCC) - <http://www.unfccc.int>
- United Nations Population Funds - <http://www.unfpa.org>

- **United Nations High Commissioner for Refugees (UNHCR) -**  
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- **United Nations Development Programme (UNDP) Climate Change -**  
<http://www.undp.org/climatechange/>
- **United Nations Development Programme (UNDP) Energy and environment -**  
<http://www.undp.org/energyandenvironment/>
- **United Nations Development Programme (UNDP) - Programming Climate Change Adaptations -** <http://www.undp.org/gef/adaptation/index.htm>
- **United Nations International Strategy for Disaster Reduction -**  
<http://www.unisdr.org/isdrindex.htm>
- **World Meteorological Organization (WMO) -**  
[http://www.wmo.ch/pages/index\\_en.html](http://www.wmo.ch/pages/index_en.html)
- **Woodrow Wilson International Centre for Scholars -**  
[http://www.wilsoncenter.org/index.cfm?fuseaction=topics.home&topic\\_id=1413](http://www.wilsoncenter.org/index.cfm?fuseaction=topics.home&topic_id=1413)

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