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Report prepared for the Norwegian Agency for Development Cooperation (Norad)

Siri E.H. Eriksen
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Siri E.H. Eriksen^{1,*}
Richard J.T. Klein^{2,3}
Kirsten Ulsrud¹
Lars Otto Næss^{4,5}
Karen O'Brien¹

¹ Department of Sociology and Human Geography, University of Oslo, Norway

² Potsdam Institute for Climate Impact Research, Potsdam, Germany

³ Stockholm Environment Institute, Oxford, UK

⁴ Center for International Climate and Environment Research Oslo, Oslo, Norway

⁵ Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich, UK

* Corresponding author. siri.eriksen@sgeo.uio.no, +47 22 84 47 28

Executive Summary

In this report, we investigate the linkages between poverty reduction and adaptation to climate change. It is no longer a question of whether to mitigate climate change or to adapt to it. Both mitigation and adaptation are essential in reducing the risks of climate change. Risks such as climate change affect poor people's strategies to secure elements of a basic living standard, including the opportunity to:

- earn an income and meet material needs;
- maintain health and a basic education;
- speak up for oneself and have rights;
- maintain a sense of social and cultural affiliation.

Vulnerability is the social and ecological context that shapes the ability to cope or secure well-being in the face of climate variability and change. Vulnerability is generated by multiple factors and processes, such as social relations of resource access, political and economic marginalization, loss of employment opportunities, and weakening of social networks. Development agencies would be well placed to initiate mainstreaming of adaptation since they have significant expertise on these processes and on targeting local needs.

While poverty and vulnerability are closely related, they are not synonymous, however. Poverty reduction does not automatically reduce the vulnerability of the poor. Similarly, not all types of climate-related adjustment will reduce the vulnerability of the poor; in some cases they could even increase the vulnerability of some groups. What is needed is consideration of the factors that affect vulnerability and measures targeted specifically at vulnerability of the poor.

The linkages between vulnerability and poverty can be summarized as:

1. any added risk by climate change to current ways of securing well-being;
2. the particular strategies or adaptive capacity of poor people in the face of climate stresses;
3. the causes of vulnerability, or specific factors and conditions that make poor people vulnerable to climate stress.

These different types of linkages imply that the mainstreaming of adaptation should not be restricted to incorporating, for example, the need for bigger pipes and drought-resistant crops into ongoing plans and activities, but instead take a comprehensive approach to adaptation and its integration into development planning and sectoral decision-making. Adding considerations of *climate change*

(impacts) to existing programmes and activities is useful, but adding considerations of climate change *vulnerability* to existing programmes and activities is necessary if adaptation is to take place in a way that contributes to poverty eradication. This means that poor people's adaptive capacity and processes contributing to vulnerability of the poor need to be targeted by adaptation measures. Unless these linkages are considered, development projects could increase the vulnerability of the poor. Adaptation also has to be understood as a political process. An adaptation measure, such as building dams and irrigation systems to stabilize water supply, may disadvantage some groups, such as those that, due to the new infrastructure, lose access to important water resources that they use in coping with drought. In order to achieve a broader type of adaptation, we focus on vulnerability reduction, which includes the social and environmental conditions that make people vulnerable to climate change in addition to all types of adjustments linked to specific changes in climatic conditions.

The various processes that lead to failure to secure the four dimensions of basic living standard in the context of climate stress represent a potential interface between poverty and vulnerability to climate change. We define sustainable adaptation measures as those that target this interface, as measures that reduce both vulnerability and poverty address the social dimension of sustainable development. Addressing climate risk, strengthening adaptive capacity, and targeting the factors creating vulnerability represent what has to be done differently in poverty eradication or development aid in order to adapt to climate change. Empirical evidence shows that climate risks, local capacity to adapt, and causes of vulnerability are all place-specific. Because of the variations in public policy, aid policy, historical, geographical and other factors, there are substantial differences in vulnerability to climate stress across regions and groups. Each specific context demands a different set of measures. Therefore, sustainable adaptation measures must be place specific, and there are no one-size-fits-all solutions that will contribute to both vulnerability reduction and poverty reduction. This places new demands on ODA staff to analyse the character of vulnerability of a given development context and identify the types of measures that are appropriate. The report outlines a three-step approach to identifying specific measures, taking people's strategies to secure needs as a starting point. The analysis performed here, in terms of the questions asked, can provide a model for how the particular linkages can be identified in any given context targeted by a development project or programme.

A review of agency reports shows that there are several institutional barriers to mainstreaming climate change adaptation into poverty reduction efforts. Current attention to climate change in development agencies, development policies, projects and programmes is low. A link to poverty reduction is also missing: where mentioned, climate change is mainly framed as a question of mitigation and largely as an environmental issue, not as a development concern. Risk reduction, for example in the form of improving early warning and evacuation procedures during drought, has formed the focus of adaptation efforts of development agencies such as Danida and GTZ.

The current formal institutions for climate policy, which have been designed for mitigation, appear to have hindered rather than facilitated a broader mainstreaming of adaptation. The fact that adaptation has been mainly seen as an environmental issue is one of the main institutional barriers to mainstreaming within development agencies. Adaptation has been treated as an extension of mitigation of greenhouse gas emissions. As a consequence of this, most agency personnel do not think of climate change as a development issue. Both in donor and recipient countries environment ministers, rather

than finance and planning ministers have ownership of the climate change issue. Norad illustrates a fairly typical pattern in ODA where all climate change activities are carried out by an environment team. Such an institutional placement of climate change further hinders its mainstreaming since environment in itself is often not a priority with development agencies. In addition, ODA agencies often focus on a few sectors per recipient country, and countries in which environment is not a focus sector therefore do not receive support for climate change measures.

There are several opportunities for strengthening the adaptation focus in ODA. High level buy-in and political prioritisation of environment and climate in integrating it into ODA is important. The awareness of climate change is rising within several development agencies, such as DFID and GTZ. Within Norwegian development cooperation, personnel working on PRSPs are an entry point to integrating adaptation in development, requiring basic and non-complex information on adaptation. Reaching colleagues who are not climate change experts is a first step as this enables them to refer further work to experts where necessary.

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List of acronyms

CAS: Country Assistance Strategies
CDM: Clean Development Mechanism
Danida: Danish International Development Agency
DCG: Drylands Coordination Group, Africa
DFID: Department for International Development, UK Government
GEF: Global Environment Facility
GTZ: German Technical Co-operation Agency
IPCC: Intergovernmental Panel on Climate Change
LDCs: Least Developed Countries
MDGs: Millennium Development Goals
NAPAs: National Adaptation Programmes of Action
Norad: Norwegian Agency for Development Co-operation
NGOs: Non-Governmental Organisations
ODA: Official Development Assistance
OECD: Organisation for Economic Co-operation and Development
OECD/DAC: Development Co-operation Directorate in OECD
PRSP: Poverty Reduction Strategy Papers
SDC: Swiss Agency for Development and Cooperation
SME: Small and Medium Enterprise
SRES: Special Report on Emission Scenarios from IPCC
STD: Sexually Transmitted Diseases
SWAp: Sector Wide Approach
TAR: Third Assessment Report from IPCC
UNFCCC: United Nations Framework Convention on Climate Change
VARG: Vulnerability and Adaptation Resource Group

1. Introduction

There is now little doubt that climate change poses a significant challenge to poverty reduction and development in many countries. Recent climate-induced disasters have had direct impacts on poor countries and on poor people; for example, during the 2000 floods in Mozambique, 700 people died and 550,000 had to be relocated from their homes (Christie and Hanlon, 2001). Mozambique's annual economic growth rate was reduced from 8% to 2%. Emerging international attention to poverty-climate links focuses on the poor as the most vulnerable to climate change, as they have the least human, financial, and technical resources to adapt (Sperling 2003; Burton et al. 2002; Tol et al. 2004). Climate change affects development interventions because:

- climate change poses risks to the development project and its deliverables (such as water supply, food security, human health, natural resources management and protection against natural hazards);
- the vulnerability to climate change of the community or ecosystem that is intended to benefit from the development project may impinge on how the project can be carried out; and
- the development project and its deliverables may have effects on the vulnerability of communities or ecosystems to climate change (Klein 2001).

This report builds on a previous study commissioned by Norad (Eriksen and Næss 2003), which examined linkages between climate change and development. The study reviewed development policies and strategies and identified poverty reduction, natural resources management and humanitarian aid as key strategic areas within which adaptation to climate change may take place within Norwegian development cooperation.

The current report focuses specifically on the linkages between poverty reduction and climate change adaptation, based on the OECD/DAC understanding of poverty, which has also been adopted by Norad and the Norwegian Ministry of Foreign Affairs. Poverty is defined as the lack of opportunity to live a decent life, including material needs, education and health, rights and influence and social and cultural affiliation and security (MFA 2002). If adaptation measures are to be consistent with development priorities (e.g., Sperling 2003), there is a need to understand how people in developing countries secure, or fail to secure, the above mentioned dimensions of a decent life. Specifically, there is a need to understand how such strategies and processes are affected by climate change. Clearly,

practically all development activities and sectors are affected by the weather and therefore have to consider climate change. The critical question is how to do so more consciously and effectively so that development goals can be successfully reached while at the same time vulnerability to climate change among poor people is reduced.

1.1 Challenges addressed

In order to identify these linkages, two main challenges are addressed. The *first* challenge is that, despite increasing recognition that adaptation to climate change and poverty are linked, the links have not been clearly articulated, and thus are difficult to address in practice. A large body of literature documents the vulnerability of different population groups (often with a local geographical focus) or the sensitivity of different production systems or crops to specific climate changes. This knowledge is fragmented, however, with little comprehensive assessment of how sectoral sensitivities, the distribution of vulnerability in a population, and responses to climate change affect the generation of poverty.

The *second* challenge is that, although it is becoming clear that development agencies need to integrate climate change concerns into their programs, it is not always clear how this can be done. Several agencies have recently screened their project portfolios in relation to climate change. Reports have typically focused on the current lack of attention to climate change, the justification for integration, and possible tools for such integration, but it is less clear what development agencies currently focused on poverty reduction should be doing differently from what they are already doing. In short, there has as yet been no synthesis of the lessons from these and the practical implications in terms of how to integrate climate change adaptation. The institutional opportunities and barriers to integrating climate change concerns in poverty reduction also need to be identified.

Climate change vulnerability studies encompass two very different approaches, both of which can provide insights for poverty reduction: One approach is based on the assessment of vulnerability as the outcome, of end impacts of projected climate changes. The climate policy literature has so far emphasised this first approach, assessing ways of reducing sectoral sensitivity to projected future changes in climatic conditions, through for example technological adaptations, such as building flood defences or switching to drought-resistant seeds (MICOA 2000; O'Brien et al. forthcoming). Sectoral adjust-

ments and technological adaptations can clearly reduce impacts and contribute to poverty reduction. Such adjustments can also contribute to climate change mitigation by reducing greenhouse gas emissions. Each adjustment needs to be identified according to the specific sectoral and climatic context. A focus on particular technological adaptations is outside the scope of this study and also relatively well researched. Furthermore, integrating climate scenarios with existing production technologies and development activities, is not sufficient for reducing vulnerability to climate change. Since a number of environmental, economic, social and political changes affect people's livelihood strategies, adaptation also involves facilitating poor people's strategies to secure a decent life in the face of threats such as climate change, and addressing those processes that make people unable to do so.

The second approach to vulnerability focuses on changing the societal factors and conditions that affect people's capacity to respond to climate change, including health reforms, education levels, and employment opportunities. In this report, we seek to address the dearth of understanding regarding how the context of vulnerability to climate change is influencing the formation of poverty. Figure 1 shows the interface between poverty and vulnerability and between poverty and vulnerability reduction measures. According to this approach, it is critical to understand how people adjust their strategies to secure a decent life in the face of threats (risks) such as climate change in order to identify the linkages between poverty reduction and vulnerability reduction measures.

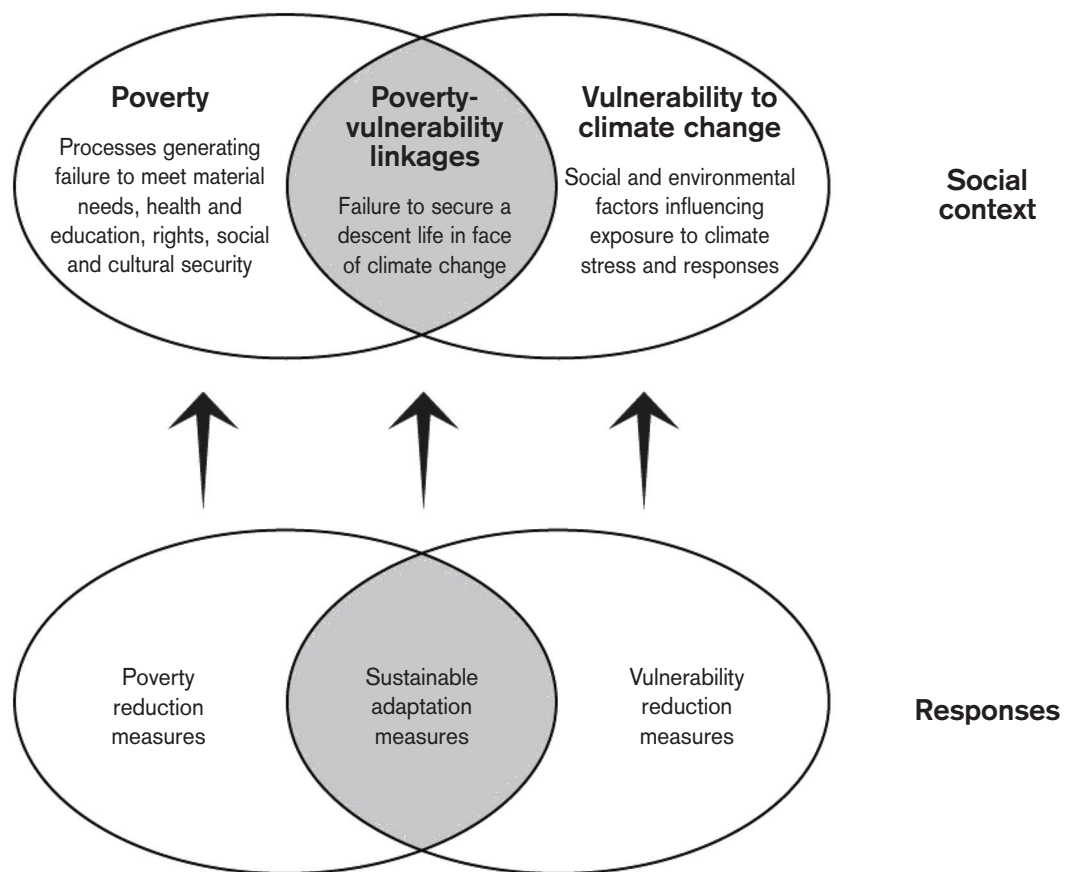


Figure 1: Poverty-vulnerability linkages and sustainable adaptation. The shaded areas show the overlap between poverty and vulnerability and between poverty reduction measures and vulnerability reduction measures. From Eriksen and O'Brien (submitted).

1.2 Structure of report

The current study includes two main components: First, it explores the practical linkages between poverty formation and vulnerability to climate change, identifying the points of interaction between poverty eradication and adaptation interventions. Section 2 explains climate change adaptation and its relation to existing development policies. In section 3, empirical studies and existing understanding regarding adaptation and poverty are reviewed in order to identify specific linkages between poverty and vulnerability. Section 4 presents an approach for identifying sustainable adaptation measures. The ways that development projects may incorporate adaptation measures are illustrated using Norwegian ODA project themes. The second component of the study is an examination of the institutional context of integrating climate change adaptation measures in development assistance policies. In section 5, we analyse recent screenings of development agencies programmes and policies. We compare these past studies in terms of their aims, activities, scope, findings, recommendations and methods in order to identify key findings and critical lessons for the integration of adaptation into development. In section 6, the institutional opportunities and barriers to addressing climate change in development assistance are investigated. Finally, policy and methodological recommendations are made in section 6.

We argue that there are three main ways that development interventions can integrate adaptation measures: first, through reducing climate risks to projects; second, through strengthening recipients'

coping and adaptive capacity in the face of climate change; and third, by targeting the causes of vulnerability. The latter two are most directly linked to poverty eradication measures and strengthening of livelihoods. However, development agencies have so far made few or no links to climate change, and the efforts that have been made have largely focused on the first type of measures, reducing climate risk. In particular, links between climate change and poverty reduction are missing in agencies' policy and strategy documents. This study suggests that the fact that climate change has been regarded as an environmental issue is a major barrier to adaptation. Climate change is mainly framed as a question of mitigation and largely as an environmental issue, not as a broader development or poverty concern. The need to address poverty and adopt a broader approach to adaptation presents new challenges to mainstreaming climate change into development. In particular, it cannot be assumed that all adaptation measures automatically benefit the poor; instead, targeted interventions are required. It is important to keep in mind that a particular adaptation measure may favour some interests and disadvantage others; indeed, some adaptation measures may disadvantage poor groups and make them more vulnerable.

2. Adaptation to climate change

2.1 Climate change and the need for adaptation

Human-induced climate change could have major adverse consequences for the world's ecosystems and societies. It is caused by the emission of greenhouse gases, which trap long-wave radiation in the upper atmosphere and thus raise atmospheric temperatures, as well as produce other changes in the climate system. Carbon dioxide is the most important of these gases. Its atmospheric concentration has increased exponentially since the beginning of the industrial revolution as a result of fossil fuel combustion and land-use change. In 1800, the atmospheric concentration of carbon dioxide was about 280 parts per million by volume (ppmv); today it is about 380 ppmv and rising. Similar increases have been observed for other greenhouse gases such as methane and nitrous oxide.

Projections of future climate change are based on global scenarios of future emissions of greenhouse gases. These emission scenarios are subject to great uncertainty, as they reflect patterns of economic development, population growth, consumption and other factors that are not easy to predict over a 100-year period. A large number of emission scenarios are used to account for this high degree of uncertainty. The most recent emission scenarios, which formed the basis of the climate projections of the IPCC Third Assessment Report (TAR), were published in the IPCC Special Report on Emission Scenarios (Nakiçenoğlu et al., 2000) and are known as the SRES scenarios.

By 2100, carbon cycle models project atmospheric carbon dioxide concentrations of 540 to 970 ppm for the illustrative SRES scenarios, with a range of uncertainty of 490 to 1260 ppm (Houghton et al., 2001). Based on these projections and those of other greenhouse gases and sulphate aerosols, the IPCC Fourth Assessment Report projects an increase in globally average surface temperature of 1.1 to 6.4° C and sea level rise of 18–59 cm during the 21st century. It is expected that land areas and high northern latitudes will warm more rapidly than the global average (IPCC 2007). Climatic changes are expected to manifest themselves as:

- Hot extremes of temperatures (very likely)
- More frequent precipitation events (very likely)
- Increased drought in sub-tropical regions and an increase in areas affected by drought (likely)
- Increase in the intensity of tropical cyclones (likely)
- Increase incidence of extreme high sea level (likely)

The United Nations Framework Convention on Climate Change (UNFCCC) identifies two options to address climate change: *mitigation* of climate change by reducing greenhouse gas emissions and enhancing sinks, and *adaptation* to the impacts of climate change. Mitigation comprises all human activities aimed at reducing the emissions or enhancing the sinks of greenhouse gases such as carbon dioxide, methane and nitrous oxide. Adaptation in the context of climate change refers to any adjustment that takes place in natural or human systems in response to actual or expected impacts of climate change, aimed at moderating harm or exploiting beneficial opportunities. It is defined by the IPCC as the “adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts” (Smit and Pilifosova 2001, p. 881).

Most industrialised countries committed themselves, as signatories to the UNFCCC and the Kyoto Protocol, to stabilising greenhouse gas emissions at 1990 levels by the year 2000 and to reducing their overall greenhouse gas emissions by an average of 5.2% compared to 1990 by the period 2008–2012. However, because of the lag times in the global climate system, no mitigation effort, no matter how rigorous and relentless, is going to prevent climate change from happening in the next few decades (Wigley et al. 1998; Pittock and Jones 2000; Dessai and Hulme 2001). In fact, the first impacts of climate change are already being observed in natural systems (Parmesan and Yohe 2003). Adaptation is therefore a necessity. On the other hand, reliance on adaptation alone could well lead to a magnitude of climate change to which effective adaptation is only possible at very high social and economic costs. Thus, it is no longer a question of whether to mitigate climate change or to adapt to it. Both mitigation and adaptation are essential in reducing the risks of climate change.

Nonetheless, and despite the fact that the UNFCCC refers to both mitigation and adaptation, until recently national and international climate policy focused mainly on mitigation. On the one hand this reflected the concern of some that a stronger focus on adaptation would weaken society's willingness to mitigate climate change, on the other hand it signified the belief of others that the “invisible hand” of natural selection and market forces will bring about adaptation without the need for policy intervention. It also reflected the limited understanding of what constitutes adaptation to climate change, which in turn resulted from the lack of attention given to adaptation by the scientific community (Kates, 1997). Since the IPCC TAR established that humans are—at least in part—responsible for

climate change and that some impacts can no longer be avoided, academic and policy attention for adaptation has increased sharply (Burton et al. 2002; Pachauri 2004).

Notwithstanding this increase in attention, the science of adaptation to climate change is still in its infancy. Interestingly, most work to date has all but ignored the fact that adaptation has been studied extensively in fields as diverse as ecology, psychology and anthropology. As a result, most recent work has focused on understanding the *concept* of adaptation to climate change without benefiting from work done in other disciplines; more research is now needed to understand its *process*. The mere existence of adaptation options does not mean that every vulnerable community, sector or country has access to these options or is in a position to implement them (Smit et al. 2000; Smith et al. 2003). Adaptation is not a new activity only relevant in the context of climate change, but instead an ongoing process both by individuals and at the level of government planning to reduce vulnerability to natural climate variability as well as human-induced climate change. The capacity at the national level to adapt to climate change is often limited by a lack of resources, poor institutions and inadequate infrastructure, amongst other factors that are typically the focus of ODA (Smith et al. 2003). The capacity by individuals and households to cope with climate stress in the short term and adapt in the long term is determined by a wide range of environmental, social, economic and political factors, which coincide with the type of factors that poverty reduction measures often address. As discussed later, the particular focus necessary for vulnerability reduction may vary from those necessary in poverty reduction, however.

It is not yet possible to distinguish between human-induced climate change and natural climate variability on a regional scale (Hulme et al. 1999). Adaptation in the context of the UNFCCC refers only to climate change, yet it is clear that many societies are not well adapted to current climate variability. Ribot et al. (1996) suggest that by addressing vulnerability to climate variability a buffer can be developed against vulnerability to future consequences of climate change. Along the same lines, Smithers and Smit (1997) suggest that for current variability, an improved understanding of individual and societal adaptation not only provides insights for estimating future adjustment, but also helps to address current problems of sustainable development in light of variable and uncertain environments. This explains the existence of “no-regret” adaptation: adaptation that would reduce vulnerability to climate change but which also has immediate benefits from reducing vulnerability to climate variability.

At the seventh Conference of the Parties to the UNFCCC (COP-7) in 2001, recognition of the high vulnerability of some developing countries to climate change and the consequent need for adaptation led to the establishment of three funds that are mainly dedicated to adaptation (Barnett and Dessai 2002; Huq 2002). A Least-Developed

Country fund and a Special Climate Change fund were created under the UNFCCC and an Adaptation fund under the Kyoto Protocol. These funds represent a major opportunity for adaptation, yet a number of problems remain, most notably that contributions to the funds are essentially voluntary and contributions to date are insufficient to meet adaptation needs. The amount of money available from the Adaptation Fund will depend on the success of international emission trading under the Kyoto Protocol, as well as on the price of carbon.

2.2 Adaptation, sustainable development and mainstreaming

The links between greenhouse gas emissions, mitigation of climate change and development have been subject of intense study (for an overview see Markandya and Halsnæs 2002). More recently the links between adaptation to climate change and development have been increasingly highlighted.

The World Summit on Sustainable Development (Johannesburg, 2002) provided a strong impetus to the discourse supporting links between climate policy and development. It has given rise to exploring and developing the concept of “mainstreaming”. Mainstreaming involves the integration of policies and measures that address climate change into development planning and ongoing sectoral decision-making, so as to ensure the long-term sustainability of investments as well as to reduce the sensitivity of development activities to both today’s and tomorrow’s climate (Klein 2002; Huq et al. 2003; Agrawala 2004a). The concept has been borrowed from development discourses, where the mainstreaming of gender issues has long been understood as an effective way of ensuring gender equity in development policies. By its very nature, energy-based mitigation (e.g., fuel switch and energy conservation) can only be effective when mainstreamed into energy policy. For adaptation, however, this link has not appeared as self-evident until recently.

Mainstreaming entails making more efficient and effective use of financial and human resources rather than designing, implementing and managing climate policy separately from ongoing activities. Prospective efficiency and effectiveness gains provide a rationale to development agencies for analysing the potential for mainstreaming in their development activities. Over the past five years, a few development agencies have taken the initiative to screen their portfolios of development activities, generally with two goals in mind: (i) to ascertain the extent to which existing development projects already consider climate risks or address vulnerability to climate variability and change, and (ii) to identify opportunities for incorporating climate change explicitly into future projects. Results and lessons from these screenings are presented in Section 5.

Past views of adaptation have tended to assume that a national government develops and implements particular, often sectoral, adjust-

ments to technologies or physical structures (e.g., dams, early-warning systems, seeds and irrigation schemes) based on specific knowledge of future climate conditions (Carter et al. 1994). In this view mainstreaming would largely refer to ensuring that projections of climate change are considered in decisions on climate-specific adjustments. For example, water managers would fit a drainage system in an area projected to experience more intense rainfall events with bigger pipes when replacing old ones, and agricultural extension services concerned about the possibility of increased drought would advise farmers to select crop varieties that are better suited to grow under dry conditions.

However, this view of adaptation is being challenged for three reasons (Smithers and Smit 1997; Burton et al. 2002; Adger et al. 2003; Smith et al. 2003). First, the uncertainties surrounding the manifestation of climate change often make it difficult to project the extent and future impacts of climate change in sufficient detail to justify investment in specific technologies, in particular on a local scale. An important uncertainty relates to the effect of a changing climate on the frequency, magnitude and spatial occurrence of extreme weather events, such as floods, cyclones and droughts. Planning specific adaptation measures based on projections of future climate conditions therefore presents a great challenge to developing countries.

Second, sectoral adjustments based on climate parameters, often focused on particular technologies or physical structures and labeled 'technological adaptation' here, can be important in reducing vulnerability to climate change, but they do have their limitations. Three issues need to be considered here:

- technological adaptation measures may be only partially effective if they do not address non-climate factors that contribute to vulnerability to climate change;
- technological adaptation measures may be ineffective if they are not suited to local conditions;
- technological adaptation measures may turn out to be maladaptive if they are implemented without recognition of relevant social and environmental processes.

The extent to which people and communities are vulnerable to climate change depends in part on the magnitude and rate of climate change and its consequent impacts but also on people's capacity to adapt. In many cases vulnerability to climate change may be reduced more effectively and comprehensively by addressing societal factors constraining people's capacity to adapt than by implementing a particular technology or sectoral adjustment that is aimed at a particular impact of climate change but which has no further development benefits. For example, the improvement of a water supply system to ensure the availability of water during dry spells will be of limited benefit to people who do not obtain access to this water. The inequitable distribution of water rights or the price of the water may

be more important factors in causing vulnerability to drought than deficient water supply technology.

In the traditional view of adaptation, adaptive capacity would refer to the ability of a national government to develop and implement technology-based adaptation measures. However, one cannot assume that a technology that has been effective in reducing vulnerability to climate change in one location will have the same effect when transferred to another location without considering the differences between these locations and without complementing the technology transfer with training and capacity building. The local context determines to what extent a technology would be suitable for a particular purpose. For example, new drought-resistant crop varieties may indeed be very resistant to drought, but their acceptance in a community also depends on their costs and availability, access to fertilizer and other inputs, storage constraints, ease of preparation, flavour and so on.

Technological adaptation measures, whilst reducing the vulnerability to climate change of some people, may unintentionally increase the vulnerability of others. For example, new coastal infrastructure could disturb the offshore sediment balance, resulting in erosion in adjacent coastal areas. Irrigation can lead to the salinisation of groundwater and the degradation of wetlands, as well as leaving subsistence farmers with reduced access to groundwater and productive land. Such maladaptation, which often affects those with little power and limited access to resources, could be avoided by recognising and seeking to understand the relevant social and environmental processes that govern the system in which the technology is implemented. Adaptation has to be understood as a political process since the support of a particular type of adaptation measure can favour one social group or area over another.

Third, the traditional view of adaptation to climate change does not consider the links between adaptation to climate change and development. People are vulnerable not only to climate change but to a range of other stresses, depending on factors such as access to resources and other socio-environmental circumstances shaped by political and economic processes (Kelly and Adger 2000; O'Brien et al. 2004). Technological measures designed to adapt to specific changes in climate may therefore fail to address the issues considered as most urgent by local communities. These issues may include access to water and food, health and sanitation, education and livelihood security. The Millennium Development Goals (MDGs) prioritise these and other issues and have become guiding principles for ODA.

The above leads us to conclude that the mainstreaming of adaptation should not be restricted to incorporating, for example, the need for bigger pipes and drought-resistant crops into ongoing plans and activities, but instead take a comprehensive approach to adaptation and its integration into development planning and sectoral decision-

making. In order to achieve a broader type of adaptation, we suggest that is useful to focus on vulnerability reduction, as this term includes the social and environmental conditions that make people vulnerable to climate change in addition to all types of adjustments linked to specific changes in climatic conditions. A mainstreamed adaptation strategy should include measures that address the underlying factors of vulnerability to climate change, particularly on a local scale. These underlying factors are often structural issues characterising low development, such as high dependence on natural resources, resource degradation, inability to secure basic needs and lack of information and capacity (Sperling 2003). If technological measures are required to reduce vulnerability to climate change, they need to be accompanied by non-technical measures (e.g. training and capacity building, institutional support) that ensure that the technologies are accessible, effective and suited to local conditions.

In view of the need to develop local capacity to achieve vulnerability reduction and to consider the links with development, development agencies would be well placed to initiate the mainstreaming of adaptation, in particular if there are synergies between vulnerability reduction and development priorities such as the MDGs, the first one of which is to eradicate extreme poverty and hunger. If such synergies exist, adaptation can be mainstreamed into development activities without much extra effort. The design and implementation of adaptation measures can benefit from the experience of decades of development work, including the realisation that measures targeting local needs are more likely to be successful than large-scale measures implemented through a top-down approach (Adger et al. 2003; Orindi and Eriksen 2005).

Since neither poverty reduction nor every and any type of climate-related adjustment automatically reduces the vulnerability of the

poor, what is needed, however, is consideration of the factors that affect vulnerability and measures targeted specifically at vulnerability of the poor. Poverty reduction does not always equate with vulnerability reduction (Adger et al. 2003; Eriksen and Kelly 2006). In these cases synergies between adaptation and development priorities may not exist. There are well-documented cases of projects aimed at reducing poverty that have in fact increased vulnerability to climate variability and change. For example, the conversion of mangroves into shrimp farms may generate economic gains but leave coastal communities more vulnerable to coastal hazards such as storm surges. New roads in developing countries often affect settlement patterns; even if a new road were constructed to withstand climate change it is equally important to consider whether or not the road would attract new settlers to areas exposed to natural hazards (Agrawala et al. 2003a). Robledo and Forner (2005) presented additional examples of how development strategies may increase the vulnerability of natural and social systems to climate change. If conflicts arise between poverty reduction and vulnerability reduction, adaptation would involve designing and implementing measures that are more targeted to specific threats than development activities tend to be. Mainstreaming can then ensure that development activities themselves are not maladapted to climate change.

We focus here on the mainstreaming into ODA of measures in the interface between poverty reduction and vulnerability reduction. These measures represents what might be called “sustainable adaptation” (Eriksen and O’Brien submitted) because by reducing both vulnerability and poverty, they address the social dimension of sustainable development. Social sustainability is recognized as a third dimension of sustainable development in addition to economic and environmental sustainability.

3. The linkages between poverty reduction and vulnerability reduction

In this section, we address the dearth of comprehensive understanding of the linkages between climate change adaptation and poverty. In order to do this, we examine evidence from both climate change vulnerability and livelihoods studies. We first briefly present conceptual discussions regarding poverty formation, poverty eradication measures, vulnerability and climate adaptation. We then examine past evidence to identify the character of such linkages in practice.

3.1 What do we mean by poverty?

The paradigm of economic growth as a major poverty reducing strategy has been increasingly criticised, both because it tends to ignore non-material or non-income aspects of poverty, as well as processes of exclusion and marginalization that generate poverty. Many people are unable to profit from new employment, market and credit opportunities to generate an income. Economic growth has often also created inequity, while enhancing equity is an essential component of reducing poverty (Øyen 2005). In order to address the complexity of processes involved in poverty formation and the heterogeneity of groups of people included in the general term 'poor', we focus on the different strategies that people use to ensure a meaningful life, and social, economic and political relations and processes that hinder the successful achieving of that goal.

Poverty has been interpreted as an extreme deprivation of well-being or the deprivation of basic capabilities. The Norwegian Ministry of Foreign Affairs Action Plan for fighting poverty (MFA 2002), based on the OECD/DAC guidelines on Poverty Reduction defines poverty as the "lack of opportunity to live what we consider a decent life on [the] basis of their own judgement and standpoint;" (MFA 2002, p 73) and describes poverty as a complex phenomenon that includes lack of income and consumption, food, clothing, shelter, as well as poor health and lack of basic skills. Poverty has also been expressed as a lack of sense of community, solidarity, the sense of lacking freedom and rights, and feeling of insecurity in the face of natural disasters, violence and economic upheavals and inability to influence their own situation. The OECD/DAC guidelines present poverty as the lack of opportunity to:

- earn an income and meet material needs;
- maintain health and a basic education;
- speak up for oneself and have rights;
- maintain a sense of social and cultural affiliation.

According to the guidelines, being able to withstand and cope with unexpected events such as natural disasters, violent conflict, and major fluctuations in the prices of products forms part of material needs. Vulnerability literature broadens the perception of how risks such as climate change affect poverty, pointing out that strategies to secure all elements of a basic living standard outlined above take place in the face of various stresses, including social, economic, political and environmental shocks and change (O'Brien 2006).

3.2 What do we mean by vulnerability to climate change?

In this report, we view vulnerability as the social and ecological contextual conditions that result in inability to cope or secure well-being in the face of climate variability and change. Vulnerability is generated by multiple factors and processes, such as social relations of resource access, political and economic marginalization, loss of employment opportunities, and weakening social networks. Vulnerability therefore varies between individuals and social groups as well as over time (Chambers 1989; Eriksen et al. 2005). Vulnerability to climate variability and change is thus not just a subset or one aspect of poverty – it permeates the way all four dimensions of poverty are generated. In contrast with the OECD definition of poverty, our interpretation of vulnerability considers the ability to cope with unexpected events more broadly as a fundamental part of all *four* needs. It is also important to understand the particular ways in which a lack of opportunities within the four dimensions is increasing vulnerability.

Vulnerability can sometimes lead to poverty. The relationship is illustrated by the case of vulnerability among populations in drylands in Kenya (Eriksen et al. 2006b). It was found that several processes had led to people in a village in Kitui district being vulnerable to drought, a form of climate stress that may increase with climate change. Conflict and insecurity, loss of farmland through government gazettement of a forest reserve, poor provision of public services and water provision, increasing economic inequalities and weak social and political relations in formal and informal institutions were processes that had led to certain households and individuals being unable to access coping strategies during drought. The impact of drought, in particular in combination with conflict, had led to loss of cattle and migration, pushing some people into destitution and extreme poverty. Since poverty is one of the outcomes of vulnerability in the face of climatic and other stressors, poverty reduction is unlikely to be sus-

tainable in the long term unless it also involves vulnerability reduction.

3.3 How do poverty and vulnerability differ?

While poverty and vulnerability are closely related, they are not synonymous, however. First, although the poverty concept has evolved to encompass a broader set of dimensions, such as the four contained in the OECD definition, its measures are generally fixed in time (Moser 1996). Vulnerability focuses on the multi-dimensional *causes and processes* of changing socio-economic well-being and people's active strategies to secure well-being (Coetzee 2002).

Second, while many of the factors shaping poverty are similar to those shaping vulnerability, they are not the same, and some factors are specific to vulnerability. Not all poor people are vulnerable, and people that are not poor can be vulnerable (Tol et al. 2004). In the Kitui case, many of those pushed into destitution were indeed vulnerable to new droughts, but some of the poor found their income in non-drought sensitive activities (such as remittances). At the same time, the vulnerable people included some people who were rich in terms of cattle and other wealth, but who were exposed to raids or who were unable to find adequate grazing during severe droughts. Poverty reduction efforts, in terms of improving performance in the four dimensions of poverty among populations, do not necessarily reduce vulnerability to climate change, and hence constitute adaptations to climate change. Some of the most important causes of vulnerability in a given context, such as limited labour availability in women-headed households during drought, reduced access to specific drought resources such as shallow wells or forest products, or increased reliance on drought-sensitive crops, may well be ignored in an approach that only focuses on poverty. Similarly, adaptation does not automatically lead to poverty reduction. Only if the specific vulnerability of the poor is considered does adaptation also contribute to poverty reduction. Though there is an area of overlap between poverty eradication and vulnerability reduction, the two do not coincide exactly, as shown in Figure 1.

Third, not all poor people are vulnerable in the same ways. Poor people differ in their livelihood strategies, social and political relations, and the types of stressors to which they are exposed. As explained by Coetzee (2002, p. 5): "...[P]overty and vulnerability do not coincide in the same way in all cases. People experiencing vulnerability are not necessarily poor; and amongst the poor, there may be varying levels and patterns of vulnerability - depending on the multitude of dynamic processes through which individuals and households respond to changes in the environment, adopt and adjust strategies, and reconfigure their relative well-being". Successful adaptation to climate change relates to very different types of strategies, relations and stressors. Some may be vulnerable primarily to drought, others to floods or seasonal fluctuations, others to loss in market for produce, disease or conflict. Processes that lead to fail-

ure to secure the four dimensions of a decent life vary. The various processes that lead to failure to secure well-being specifically in the context of climate stress represent a potential interface between poverty and vulnerability to climate change.

3.4 What are the main linkages between poverty and vulnerability?

Our focus is on how people in developing countries secure, or fail to secure, the four dimensions of a decent life in the face of climate change.

The linkages representing the shaded interface between vulnerability and poverty shown in Figure 1 can be summarized as:

1. Any added risk by climate change to current ways of securing well-being.
2. The particular strategies or adaptive capacity of poor people in the face of climate stresses.
3. The causes of vulnerability, or specific factors and conditions that make poor people vulnerable to climate stress.

The starting point for identifying the linkages between poverty and vulnerability is understanding the particular ways that poor people secure or fail to secure needs. What are people's strategies for securing the four types of dimensions of a decent life? It is important to understand the different dimensions of poverty to be able to analyse the additional stress from climate change, who is vulnerable to climate change and why, and which options people and society have for adapting to climate change. Such an understanding is also critical to understanding potential effects of ODA and other interventions on people's vulnerability and ways of incorporating adaptation in development interventions.

This information is critical for understanding how climate change may influence poverty and poverty formation among particular groups or in any particular area. The first poverty-vulnerability linkage can be investigated by asking what is the risk posed by climate stress to people's strategies to secure needs? For example, what is the specific role of climate shocks in hindering or enabling the poor in securing material needs, health and education, rights, and social and cultural needs? The second linkage concerns how people cope with climate stresses in the short term and adapt their livelihood systems in the long term. What specific factors or contexts render some people unable to cope or adapt? Which of these factors are related to poverty, and how may vulnerability *reinforce* poverty processes? The third vulnerability-poverty linkage relates to the identification of the most important societal or environmental changes and relationships causing vulnerability among poor people in an area. What processes, such as biodiversity loss, economic marginalization, or privatization of resources are creating a context where people are unable to adapt to climate stress?

3.5 The interface between poverty reduction and vulnerability reduction

How can one identify the implications for ODA, in terms of what new measures or alterations to existing interventions are necessary in order to implement adaptation? Sustainable adaptation measures are those that target the vulnerability-poverty linkages identified above, reducing both poverty and vulnerability at the same time. In Figure 1, the shaded interface between vulnerability reduction and poverty reduction consists of measures that address these three types of linkages. In other words, addressing climate risk, strengthening adaptive capacity, and targeting the factors creating vulnerability represent what has to be done differently in poverty eradication or development aid in order to adapt to climate change. Key questions therefore include: what are potential measures that can target risks posed by climate change to securing needs, strengthening poor people's coping and adaptation strategies, and targeting critical poverty and non-poverty factors that cause vulnerability?

An important implication of the need to address three types of vulnerability-poverty linkages is that while adding *climate change* (impacts) to existing programmes and activities is useful, adding climate change *vulnerability* to existing programmes activities is nec-

essary if adaptation is to take place in a way that contributes to poverty reduction. In addition to targeting the climate risk to development projects, or reducing sectoral sensitivities through technological adjustments, such as switching to drought-resistant seeds or building flood defences, adaptation in the context of poverty eradication entails a strengthening of the capacity to secure well-being in the face of climate stress, i.e. ability to engage in coping and adaptation strategies. Furthermore, adaptation involves targeting the multiple stressors that are generating vulnerability, or the causes of vulnerability that lead to people having weak coping and adaptation strategies.

Here, measures are suggested that directly correspond to the linkages identified above, with illustrations from a limited number of existing studies on adaptation and development. Nine ongoing and recent Norwegian ODA projects are selected and potential measures that could support adaptation are illustrated for each of them. How, institutionally, adaptation can be taken up within ODA organizations is critical for the actual implementation of such measures. This issue is further explored in section 5 through analysis of past efforts by five agencies to mainstream climate change adaptation into their activities.

4. How to identify sustainable adaptation measures – a three step approach

Given the diversity of geographic regions, population groups and contexts that form the target of development aid, it is impossible to comprehensively describe all the different ways in which poverty is formed, all factors shaping vulnerability nor all possible measures that can target adaptation. In this section, we seek to illustrate some of the key facets of these issues in order to explain how linkages between adaptation and poverty can be understood. Tables 1-3 summarises some important points, a selected few of which are described in more detail in the text. The analysis performed here, in terms of the questions asked, can provide a model for how the particular linkages can be identified in any given context targeted by a development project or programme.

4.1 Step 1: How do people secure or fail to secure needs?

Poor people are a diverse group and include urban workers, unemployed slum dwellers, smallholders in agriculture, rural workers, pastoralists and fishers among others. These groups secure their needs in very different ways; however, common for most groups of poor people may be what Hesselberg (1996) terms multiactivity on a household level. Livelihoods of the poor are thus based on multiple activities and diversification of sources of food income and security (Ellis 1998; Chambers 1995). Increasingly we can also talk about multilocality – people living in several places and splitting up families, living both in rural and urban areas, moving between city employment, small-town work and agricultural labour, seasonally or more sporadically, in search for an income (Hesselberg 2005).

A few features emerge regarding how people succeed, or fail, in securing multiple livelihoods. First, livelihood studies have highlighted the importance of access to a wide range of resources in securing income, food and other material needs (Carney 1998; Homewood 2005). Livelihood strategies involve different members of households in varying activities through the year, including home-gardening, use of common property resources, share-rearing livestock, and family break-up. Rights to land, water, trees and other natural resources are important in securing livelihoods. In addition to tangible assets, such as natural resources, food stocks, stores of valuable items (jewellery, textiles), cash savings in thrift banks and credit schemes, livelihoods can be secured through intangible assets or claims which can be made for material, moral or other practical support. Such claims are also used to access resources, services, or to obtain information, material, technology, employment, food,

income and physical security. Social networks are important to how poor people secure needs (Adams et al. 1998).

Second, in addition to access to resources, societal changes are important for the ways in which poor people seek niches and negotiate for improvements in life. Such changes result in a dynamism and complexity in the reality of the poor (Hesselberg 1996; Øyen 2005). Although large parts of poor populations live in rural areas and engage in agriculture, important shifts in livelihoods and causes of poverty have increasingly been tied to the trends of deagrarianisation and increasing diversification. Rigg (2005) questions the assumption that poverty is generated by the poor productivity of agriculture and small size of landholdings among small-holder production. Structural transformations are driving deagrarianisation, with rural-urban migration and non-farm activities becoming more and more central to rural livelihoods. Livelihoods and poverty are becoming delinked from land and farming. The author further argues that the profitability of farming is being eroded, due to national policies favouring industry, taxation, structural adjustment and neo-liberalism, and declining terms of trade between farm and non-farm activities.

Third, a main reason that people fail to secure needs is that their multiple strategies and sources of subsistence may be insecure and marginal. Even though non-farm activities are becoming more important, most people are unable to access formal sector income opportunities and instead resort to informal activities both in rural and urban areas which may yield a less secure and/or smaller income. Poor people often lack the education, skills, and networks that are increasingly necessary to access to new income sources. Although a rural poor household may earn income from a variety of sources including gathering wild plants and animals for food and labour migration, these activities may, for some or all of the time, be insufficient to ensure basic needs (Reardon and Vosti 1995). In particular, households may lack the natural resource assets, on-farm physical and financial assets and off-farm physical and financial assets to engage in the desired activity at the desired scale. Women often have very little time to devote to alternative sources of income due to domestic chores and farming responsibilities; in addition, they may be excluded from some activities, such as honey collection, due to cultural norms, or the starting of business or cattle rearing due to lack of capital and ownership arrangements that confer all rights to men in the family (Buhl 2005; Eriksen et al. 2005).

Fourth, some of the informal sector activities to which most people have access are also becoming more marginal. For example, natural resources form an important source of livelihoods for many poor people in rural and peri-urban areas. The degradation of ecosystem services, as well as loss of access to natural resources through tenure changes, commercialisation or creation of nature conservation areas may contribute to poverty generation (Hassan et al. 2005; Bowen et al. 2003; Brockington 2005; Eriksen et al. 2006a,b). In addition to the marginality of non-farm income opportunities, some of the main factors generating poverty are market position and urban unemployment. Remoteness, poor marketing information, and limited capacity to transport produce to markets of a good price and hence reliance on middlemen contribute to weak bargaining power and market relations among many rural households (Eriksen and Silva 2003). The prevailing low market prices of export crops such as cereals, coffee, cocoa and tea, on and dependence on expensive

imports such as oil contribute to low rural incomes (Rigg 2005). Liberalisation processes and dependence on global markets can therefore have serious consequences on rural livelihoods (O'Brien et al. 2004).

Another facet of the securing of the four dimensions of a decent life is the interrelationship between the dimensions. Deprivation in one dimension of needs affects the ability to secure the needs in other dimensions, as illustrated in Figure 2. Conversely, failure in securing one need, such as education, may lead to failure in securing another, such as income and material needs. This interrelationship is demonstrated by urban poverty, where a lack of civil and political rights combine with inadequate incomes or assets amongst households, poor-quality housing, and a lack of basic infrastructure for providing water, sanitation, drainage and garbage removal (Bull-Kamanga et al. 2003).

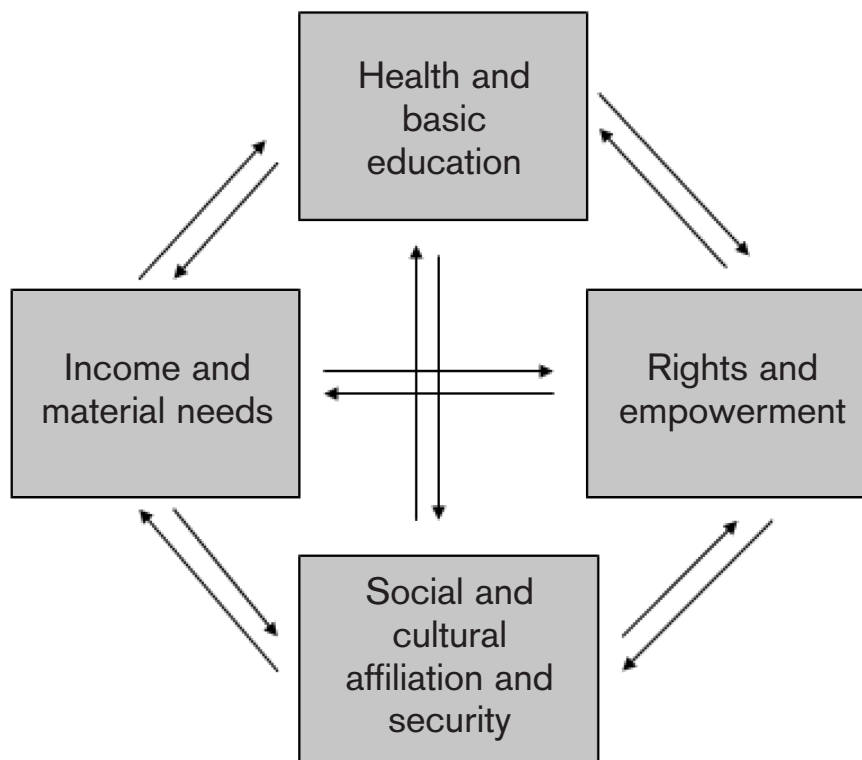


Figure 2: Interaction between dimensions of decent life. The arrows signify that deprivation in one dimension may contribute to inability to secure another.

People secure the four needs in diverse ways. While **education** has been relatively widespread in some developing countries such as Tanzania, many people still lack education. For example, in Mozambique, more than half of adults are illiterate (hdr.undp.org/statistics). Education is often a major expense and investment to households. Assets such as livestock or parts of the harvest are often sold if remittances or other assistances are unavailable to pay for school related expenses. Payment of school fees can be difficult and is often required at a difficult time of year, coinciding with food shortages, high labour requirements in agriculture, indebtedness and high incidence of disease (Chambers 1995). Some parents may be unable to send their children to school due to the costs, or may choose to send their children to carry out income generating activities, such as livestock rearing, farming, or trade. In other cases, distance and remoteness, forms of nomadism where children move around with their families and therefore cannot attend a sedentary school, or insecurity due to conflict and war, may prevent people from achieving of education.

Poor people seek to secure **health** through both formal and informal health care. In developing countries, many people commonly lack access to formal health care, partly due to the poor coverage of health facilities, the lack of qualified personnel and medicines in public health facilities, and partly due to the cost of accessing these services. While the coverage and quality of health facilities may be better in the cities, the cost can be prohibitive. Often, poor people may go to a clinic or health station only as a last resort due to the distance (in rural areas) and because of lack of money to pay the bills. The use of local herbalists is relatively common, both because they are trusted and may be available closer to the home (Bowen et al. 2003). Herbalists are often expensive as well, however, and many poor people resort to collecting their own herbs and local medicines based on local knowledge. These strategies are undermined by declining access to medicinal herbs and trees due to loss of local biodiversity, common property resources and local knowledge (Eriksen 2005). In addition to inadequate access to health care, poor nutrition and hygiene due to lack of water and food, a high prevalence of malaria, diarrhoea related diseases and HIV/AIDS, and poor condition of housing and its location in polluted areas especially in urban informal settlements, are factors that contribute to a failure to secure a good health.

Good health and adequate health care are important to poor people not only because freedom from disability, sickness, pain and suffering is basic element of a decent life, but also because many poor people depend on hard physical work and labour intensive livelihood activities to secure material needs. Diseases such as HIV/AIDS in Africa are severely affecting local livelihoods through both loss of breadwinners and time and money spent on caring for the ill (Quinlan et al. 2005). HIV/AIDS has led to the break-up of families,

children losing their parents, and thus the weakening of local knowledge flow, social isolation and cultural sense of belonging.

Formal institutions, social and political relations, kinship ties, and customary institutions form part of securing **rights and empowerment** (Homewood 2005; Eriksen et al. 2006b). Powerlessness, difficulty to organise and bargain, lack of influence and lack of independence form important aspects of poverty. Violence and abuse of women and girls take place where women have few rights and very little access to a formal court of law or weak influence in customary law systems, for example. Where a political and economic elite has monopolised powerful positions in national institutions, large parts of the population have very little influence and few rights that can be effectively asserted in formal judiciary systems. Such lack of rights may involve exclusion from decision making regarding relocation of their village in relation to a dam project, gazettelement of forest or other lands that are important culturally as well as for securing livelihoods, or inability to lodge complaints regarding corruption, stealing or unfair treatment by local officials. The lack of rights and influence also lead to poor income and material conditions. Indigenous people may have less access to water and other necessities than the population at large, weak groups often being neglected by both national and local governments. Similar problems have been evident among poor in large and/or rapidly growing cities, such as the megacities of Bangkok, Jakarta and Manila (Loneragan 1999). Policy-makers are not enforcing environmental laws, human rights and legislation, and the poor are unable to claim these rights in practice.

Institutional reforms towards decentralised and participatory local development have opened some spaces for social movements that may represent opportunities to democratise development and influence decision making. At the same time, however, it has also sometimes served to absolve central government of responsibility for development and the need to change national and international framework conditions that influence the opportunities available to the poor (Stokke 2005). Reduction in services from the state, such as access to free water supply or free education, exemplify such negative consequences, which pose enormous hardship on millions of low-income families, by jeopardising their potential to lead healthy and productive lives (Harvey 2003).

Social and cultural deprivation can be manifested in social inferiority (due to age, gender, caste, race, ethnic group, class, social group and occupation). Often, geographic isolation and the lack of contacts, means of communication and information are contributing factors to a failure to secure social and cultural needs. The strength of customary institutions and local knowledge is important in gaining social and cultural affiliation and security. Social and cultural needs are often secured through participation in networks, associations and social movements. Such forms of social capital may also

contribute to securing other dimensions of a decent life, such as material, education or health. Individuals and collectives interact through formal and informal rules, regulations, norms, conventions, institutional arrangements and decision-making processes to gain and maintain their command (access, use and control) over the resources and benefits extracted from them. For example, the commands of an individual, household or group over fishing resources depend on their social position, which depends in turn on factors such as ethnic and religious affiliation, gender, kin, wealth and fishing gear (Béné 2003). Conversely, social marginalization includes the denial of command over a resource, service or commodity. Marginalisation based on ethnic criteria is exemplified through the denial of those in the minority or newly settled in one area by the local population (or even government authorities) based on ethnic

considerations, such as of pastoralist groups from grazing and water resources, as observed in some places in Kenya (Owuor et al. 2005). When identifying poverty-vulnerability linkages in an area targeted by ODA, it is important to consider the specific ways in which people secure basic needs since these strategies vary from place to place. Furthermore, it is important to understand poverty not as a delimited social problem, isolated from the rest of society, but as an integrated part of the distribution of resources in society, of inequity, and of social exclusion. Since poverty is generated partly by processes external to the household, such as exclusion from resource rights, poverty reduction involves targeting measures at higher geographical levels than that of a household or village, such as changing national power structures and national and international framework conditions.

Table 1. How people secure or fail to secure needs and the processes that shape their ability to do so: Some examples

Dimensions of poverty	Poor people's strategies to secure needs	Processes that affect strategies to secure needs
Income and material needs	<ul style="list-style-type: none"> • Multiactivity in agricultural and non-agricultural activities • Multilocality, migration and mobility • Resource access and rights • Tenure systems and power relations • Social networks • Marginality of non-farm income • Entry barriers to non-farm activities • Lack of capacity to engage in activity at desired scale • Poor health and lack of household labour 	<ul style="list-style-type: none"> • Declining agricultural performance • Deagrarianisation and increasing diversification • Policies favouring industry, and neo-liberalism • Constraints to urban employment • Erosion of profitability of natural resource based activities • Structure, performance and exploitative position in markets • Environmental degradation • Loss of access to common pool resources • Economic exclusion from natural resources
Health and basic education	<ul style="list-style-type: none"> • Sale of assets and accessing remittances • Use of local herbalist or own local medicinal knowledge • Public and private health clinics • Remoteness and lack of access to health facilities • Inability to afford expenses • Nomadism • Labour requirements in farming and non-farm activities 	<ul style="list-style-type: none"> • Environmental degradation • Closure or inaccessibility of facilities due to insecurity and violence • Loss of local knowledge and biodiversity • Decline of public facilities • Increasing costs of public and private health services • Spread of infectious diseases such as HIV/AIDS
Rights and empowerment	<ul style="list-style-type: none"> • Diverse institutions, including customary rights and institutions • Uneven power relationships • Lack of access to formal institutions and procedures • Lack of education, skills and political connections 	<ul style="list-style-type: none"> • Decentralisation and democratization, social movements of poor • Absolving of central government responsibility • Monopolisation by elite of powerful positions • Government restrictions on informal sector activities • Social exclusion (gender, ethnic)
Social and cultural affiliation and security	<ul style="list-style-type: none"> • Participation in networks • Lack of access to networks of the non-poor • Customary knowledge and local institutions • Remoteness, lack of means of communication, isolation 	<ul style="list-style-type: none"> • Social marginalization (ethnic, gender) • Policies and interventions, either strengthening or undermining informal institutions and networks • Policies and interventions that exclude ethnic or social groups from resource access

4.2 Step 2: What is the influence of climate variability and change on how people secure or fail to secure needs?

In this section, we exemplify poverty-adaptation linkages under different contexts and conditions. The description cannot be considered exhaustive nor a blue-print for adaptation since both poverty and vulnerability are dynamic and continuously change (Leichenko and O'Brien 2002; Eriksen et al. 2005). Instead, the empirical evidence illustrates the factors that can be considered and how our framework can be used in identifying poverty-vulnerability linkages in adaptation policy development in different contexts.

We discuss how climate change and variability may pose risks to strategies to secure well-being; the adaptive capacity of poor people in the face of climate stresses; and the causes of vulnerability among poor people. These are summarised in Table 2.

4.2.1 Risks posed by climate change and variability to strategies to secure well-being

Climate variability includes seasonal variability as well as interannual variability, sometimes manifested in extreme events such as droughts, floods, cyclones and heatwaves. Climate change, in term of change in average conditions over time due to global warming, will vary from place to place even within countries and is also likely to lead to increased variability and changes in seasonality such as in the onset, duration and reliability of rains as well as decreasing predictability of extremes (Joubert and Hewitson 1997). In the context of this report, we regard both the variability and changes as forms of climate stress that affect the livelihoods of the poor and to which people have to cope in the short term and adapt in the long term.

Potential hazards from climate change include increased surface temperatures, sea level rise, decreased or increased precipitation, soil erosion, fluctuating and changing courses of rivers, changes in frequencies and intensity of storms, changing weather patterns, including drought and flood patterns, glacier lake outbursts from increased melting of ice capped mountains. In addition, receding glaciers in the Himalayas affect water supply. Climate change can also cause damage to infrastructure such as feeder roads, erosion and flooding, affecting subsistence and commercial farming.

Climate change and variability play an important role in hindering or enabling the poor in securing material needs, health and basic education, rights, and social and cultural needs. Problems that are experienced by poor people due to droughts and heat waves, for example, include those of feeding and watering animals, and a lack of water for crops, as well as water scarcity for consumption and health problems both in rural and urban areas. Flooding, heavy rainfalls, cyclones and hurricanes and sea level rise destroy property and productive assets, as well as causing injuries and deaths (Mallick et al. 2005).

Climatic stress puts further pressure on strategies to gain basic needs such as health and basic education. Droughts and floods both lead to poor water supply, unsanitary conditions and the spread of diseases. The weakened health state of people due to poor nutrition often leads to disease outbreaks during onset of rains after prolonged drought. Climate change may increase mortality as well as ability to work due to heat stress; in addition to exacerbating air pollution, and increasing vector-borne and water borne diseases (Garcia-Herrera et al. 2005; Watson et al. 2005). Children drop out of school because they are too hungry or because they assist their parents in accessing alternative livelihood options, by searching for wild foods in the forest, or by engaging in casual employment and petty trade (Eriksen et al. 2005).

Some of the most climate sensitive economic sectors are also those that are critical to the OECD/DAC definition of poverty, including agriculture, food security and material needs, water and health (Williams 2005). Environmental degradation undermines local capacity to ensure needs because it reinforces the declining profitability of natural resource based activities. This will affect employment and other livelihood-activities. Climate change may also exacerbate environmental degradation through, for example, drying up and reduced water availability.

Climate impacts can in some cases also be positive. Lin et al. (2005) illustrate how, in a case from Northeast China anticipatory adaptation has enabled farmers to take advantage of increased temperatures and increase production. Environmental problems such as water shortages and urbanisation are nevertheless stress factors and in the longer term and with larger temperature changes, the negative impacts may decrease or reverse the short term potential benefits of temperature increases. In order to understand the actual impacts on poor people in specific, rather than on a production in general, it is necessary to understand the way that potential positive and negative effects are distributed in a population and their ability to respond. Since most poor people operate in multiple sectors, changes in productivity, economic output or technology at a macro scale in the face of changes in climatic conditions in one sector cannot be extrapolated to make generalisations regarding poverty without considering the range of other sectors as well as the political, social and economic conditions in which people make a living (Chambers 1995).

4.2.2 Adaptive capacity of poor people in the face of climate stress

Multiactivity and multilocality, two key aspects of the way that poor people secure income and material needs, are reinforced by difficult climate conditions such as drought. In the drylands of Mozambique and Kenya, for example, people migrate with cattle to access grazing; in addition, people migrate for casual employment in other rural areas where a drought, for example, is less severe, or to cities for

formal or informal employment. Remittances from cities or other countries are critical for ensuring basic needs during drought in rural areas (Eriksen and Silva 2003; Eriksen et al. 2005). The Sahel has experienced a fall in rainfall of 25% since 1960's compared to the previous period, combined with several harsh drought years, according to Toulmin (2005). The responses of the farmers include shifts to shorter cycle varieties of millet and maize, abandonment of crops that need higher rainfall. Herding has moved south, into settled cultivated areas, demanding solutions on conflicting interests. Wells and small dams are made for watering vegetables for sale. Since the late 1960's, 5 million people from Burkina Faso and Mali have migrated south to neighbouring Côte d'Ivoire. There are, however, uneasy relations between incomers and local people and growing shortage of land.

The cases above demonstrate that *mobility and flexibility* in income opportunities become critical under a variable and changing climate, partly to reduce dependence on climate-sensitive activities, partly to be able to access different opportunities that avail themselves during intra-seasonal or inter-seasonal climatic changes.

Nevertheless, such adaptations also have negative consequences for people's ability to secure basic needs. Migration and relocation due to droughts and floods lead to loss of cultural and social security. Relocation often entails splitting up of families as both education, physical safety and material needs need to be secured. Relocation represents severe stress on cultural and social ties. Not only do people have to restart their lives in unfamiliar settings that may be far removed from their original homes, relatives and neighbours; in addition, their reliance on assistance either from friends or relatives may exhaust social relations. Local knowledge may be lost or irrelevant and new social networks have to be built. Gaining access to networks of the non-poor may be particularly difficult in a situation of disaster. At the same time, those with access to such networks are likely to be much less vulnerable in terms of material, health and rights needs as well. These social and cultural dimensions are often disregarded in climate change research which has focused on food security in rural areas.

4.2.3 The causes of vulnerability among poor people

Several processes of change are affecting poor people's capacity to adapt to climate stress. For example, a complex mix of factors has been shown to be detrimental to adaptive capacity in several African countries. Problems of, for example, HIV/AIDS, poor governance, and land conflict, mean that, for some, small climate changes can have a significant impact. These other stresses made the meteorologically less severe 2001-2003 drought in Southern Africa have a perhaps greater impact on livelihoods than the 1991-1992 drought. During the 2001-2003 crisis, the running down of strategic grain

reserves were a far more significant factor than adverse climatic conditions on maize harvest. Human vulnerability was shaped by policy processes, market liberalisation as currently implemented and the HIV/AIDS pandemic (Vogel 2005). One of the major changes facing southern African populations is the liberalisation of economies. The related decline in formal sector employment, rising costs of social services such as health and education, and exposure of farmer crops to international price fluctuations, has been identified as a potential cause of vulnerability (Leichenko and O'Brien 2002).

It has also been observed that remoteness is closely linked to actual market position and structure of markets under liberalisation, and the terms of trade that rural populations can bargain for in selling livestock, charcoal, or labour, in return for food and household items. Eriksen and Silva (2003) demonstrate how economic opportunities may narrow during a drought among the large parts of the population who cannot access formal livelihood options. As the local economy closed down in villages in Mozambique during the 2003 drought, people resorted to sale of charcoal and other livelihood options that involved engaging with outside and urban markets, but in relations that were highly exploitative. The poorer people who could not afford to irrigate crops nor transport products to markets that offered good prices all resorted to similar activities, typically growing pumpkin leaves in river beds for consumption and sale in the local market, producing charcoal for informal sales to traders, and casual employment on commercial farms. These activities had marginal and decreasing returns with the increasing number of people engaging in them. The marginality of non-farm incomes to which most households have access, barriers to non-farm activities, and erosion of profitability of natural resource based activities become critical factors determining vulnerability during climate variability and change (Eriksen 2005). Paradoxically, therefore, non-farm income sources become even more important, but typically also even more marginal, during climate stress. Some are unable to earn enough to reinvest in inputs for farming during the next season and continue in 'coping mechanisms' such as casual employment more or less permanently. Thus climate vulnerability may reinforce existing trends driving poverty, including unsuccessful diversification and increasing inequalities as well as declining agricultural performance and migration to cities.

Other processes contributing to vulnerability are political in nature. For example, disempowerment, through difficulty to organise and bargain, lack of influence and lack of independence, affects vulnerability. Political processes, such as conflict, can also serve to push people into destitution, both in terms of loss of material assets, access to health and education, political rights and cultural affinity, and make them increasingly vulnerable to stresses to livelihoods, such as droughts (Lind and Eriksen 2006). Lind and Eriksen identified such destitution as a major barrier to adaptation. Households that are pushed into such destitution are often unable to rebuild their

assets through their 'traditional' livelihood activities since these are so marginal. They are therefore forced to depend on multiple livelihood activities that are unreliable and yield little income and are unable to invest the capital needed to gain access to higher income

activities. New technological or economic options that would form part of adaptation to longer term climatic changes therefore become unavailable.

Table 2. The influence of climate variability and change on the way that people secure or fail to secure four types of basic needs: some examples

Dimencions of poverty	Climate risk to ways of securing needs	Coping and adaptation strategies to climate stress	Factors and processes causing vulnerability among poor
Income and material needs	<ul style="list-style-type: none"> • Increased variability, heat stress, flooding and drought inhibiting livestock and cultivation • Damage to productive assets and infrastructure • Urban disasters • Enhanced agricultural potential in some areas • Terms of trade deteriorate during crisis • Cut off from markets by floods 	<ul style="list-style-type: none"> • Increased multiactivity, multilocality and migration • Shifts in cultivation and herding practices • Destitution and inability to adjust long term and inability to access adaptation initiatives • Reinforced need for access to common pool resources • Increased dependence and need for local/informal economic opportunities/remittances 	<ul style="list-style-type: none"> • Increasing marginality of off-farm livelihoods as well as natural resource based activities • Increasing inequality • Environmental degradation undermining livelihoods • Economic liberalization related changes • Interaction with stressors such as HIV/AIDS and conflict • Barriers to formal markets and employment opportunities • Dependence on conventional energy • Economic specialisation increases vulnerability
Health and basic education	<ul style="list-style-type: none"> • Droughts and floods cut people off/increases remoteness from facilities • Poor water supply and sanitation, heat stress and pollution • Dropping out of school due to non-payment of fees, hunger or coping strategies 	<ul style="list-style-type: none"> • Increased dependence on school feeding programmes • Increased cash need for hospital bills and demand for indigenous medicinal plants • Increased reliance on social networks to cover costs • Loss of breadwinner to disease and labour time spent caring for ill 	<ul style="list-style-type: none"> • Poor education and generation of knowledge inhibits responses and access to climate information • Poor nutrition and health services compound disease outbreak and loss of productive labour during droughts and floods
Rights and empowerment	<ul style="list-style-type: none"> • Loss of democratic rights through dependence on aid • Redirecting of attention from poverty to climatic change and 'external' factors • Shifts in power relations • Social mobilization • Informal adjustments to tenure and access rights • Monetisation of critical drought resources 	<ul style="list-style-type: none"> • Dependence on kinship ties and social networks • Gazettement and privatisation of land undermine resource rights and coping strategies of the poor 	<ul style="list-style-type: none"> • Local democratization strengthens access to developments such as water • Powerless/excluded groups vulnerable • Informal rights precarious • Loss of international formal migration rights increases vulnerability
Social and cultural affiliation and security	<ul style="list-style-type: none"> • Crises justifying social exclusion • Climatic events increase isolation • Relocation and remoteness from social and cultural ties • Breaking up of families and networks 	<ul style="list-style-type: none"> • Increased reliance on social networks • Increased reliance on local knowledge to cope and adapt to climatic changes 	<ul style="list-style-type: none"> • Inability to access networks of non-poor reinforced • Existing social networks and customary institutions exhausted? • Loss or irrelevance of local knowledge to new geographic areas, livelihood options and networks

Existing power relations pervade droughts, conflicts, and other stressors but can also be shaped by such stressors. Famines are often used politically, for example to buy political loyalties. People who are poor and dependent on aid during drought (and who are threatened with withdrawal of aid if they do not vote for the government) may therefore in practice lose important democratic rights. Droughts are also often used to absolve government responsibility for poverty generated by lack of investment and government inaction, as droughts or floods are explained as 'external' factors for which no one could prepare. Crises such as drought may be used as justification for excluding people from resources, either by kin, gender or ethnicity (Eriksen et al. 2006a). Disempowerment therefore undermines the adaptive capacity of the poor. On the other hand, democratisation at the local level may increase local influence over critical development, such as water supply, as well as the accountability of governments in poverty eradication efforts.

Poor education and generation of knowledge contribute to vulnerability in the face of climate stress: "In practice, use of climate information for development in Africa is still extremely poor." (Williams 2005, p.2). The lack of capacity to perform technical and sectoral adjustments to ensure the gaining of a decent life in the face of climate change is thus a major contributor to vulnerability. Identifying the processes that generate such a lack of capacity is critical to developing efficient adaptation options.

4.3 Step 3: What new measures or alterations to existing interventions are necessary in order to implement sustainable adaptation?

In this section, we explore potential measures that can address adaptation by targeting climate risk, the strengthening of adaptive capacity, and the causes of vulnerability. Measures are exemplified that correspond to the ways that climate variability and change interact with poverty (see Table 3). There is an array of possible measures that could contribute to sustainable adaptation. Because of the variations in public policy, aid policy, historical, geographical and other factors, there are substantial differences in vulnerability to climate stress across regions and groups. Each specific context demands a different set of measures.

It is important to realise that people's responses in the face of shocks and longer term changes can be both facilitated and hindered by government policies and measures. For example, in some areas, local varieties of seeds which are well adapted to local climate conditions, are disappearing because of agricultural development projects (Orindi and Ochieng 2005). In many cases, development is contributing to increased vulnerability through a variability of socio-economic, political, environmental and cultural factors (Yamin et al. 2005). Toulmin (2005) recommends that climate change resilience be built systematically into new projects and policies for action

regarding climate change and that what is already being done in terms of adaptation by local people and organisations be recognised. Below, we exemplify three types of sustainable adaptation measures.

4.3.1 Risk reduction

Risk reduction has often focused on the improvement of early warning and evacuation procedures during floods. A focus on climate risk to education, health, and social and cultural rights implies that measures are required also to improve transport and roads, communications and accessibility during floods to counteract geographic isolation. Furthermore, adjustments such as timing school fees to avoid drought times of the year can assist people to achieve education in the face of climate stress. Physical infrastructure, such as that related to water and energy provision, could be made more climate resilient. Satisfying energy needs is often difficult because hydroelectric power generation and distribution are affected by both droughts and floods. Alternative energy sources such as solar panels, though increasing, are still in their infancy in terms of access by the poor (Venema and Cisse 2004; Ulsrud 2004). Quality of housing and infrastructure in low-income urban areas in the face of cyclones and floods is another measure that could address urban disasters.

Risk reduction measures are often very specific: potential reduction in agricultural productivity due to climate stress, or increased climate risk, can be targeted through measures aimed at changing cropping patterns and technologies in response to particular climate parameters. In Senegal pilot farms are adapting to successive droughts and drying climate by planting dense perennial hedges that act as windbreakers, generating an agriculturally conducive microclimate (Seck et al. 2005). A case study of two drought-prone villages in Rajasthan in India reveals responses to decreasing groundwater recharge, decreasing water levels, serious crop failures and a lack of fodder for animals. Government institutions, development agencies and NGOs have supported initiatives both at policy and local levels to cope with the recurring droughts, building on local knowledge. Measures include improved methods of storing grain and fodder; improved water conservation and harvesting techniques; introduction of a diversity of crops and the production of vegetables during winter. In addition, the production for commercial sale of high value medicinal crops that do well during drought conditions has become an alternative source of income. The authors recommend that a national agricultural insurance scheme be changed to become available to the most vulnerable, in order to prevent, rather than respond to household food insecurity (Chatterjee et al., 2005).

4.3.2 Enhancing adaptive capacity

The case above demonstrates how measures that target risks can be combined with measures aimed at strengthening local adaptive capacity when addressing a particular vulnerability context. Some

measures, such as improvement of infrastructure and improved techniques of water conservation can both contribute to reducing risk and to strengthening alternative livelihoods during drought. One of the main linkages between vulnerability and poverty identified in the previous section was the importance of multiactivity and multilocality in the way that people seek to secure basic needs. An implication of these shifts is that efforts aimed at reducing the vulnerability of rural poor have to target the multiple sectors and spheres in which people are engaged, and not just the sensitivity and performance of the agricultural sector. Enabling movement across national frontiers, installing transparent systems for outsiders to gain access to land and providing reliable channels for migrant's remittances would enhance mobility and flexibility critical to people's adaptive capacity in the face of climatic variability and change (Toulmin 2005). Eriksen et al. (2006c) suggest that securing migration routes for livestock keepers, including veterinary, physical and social infrastructure in those areas and ensuring access rights to important drought grazing areas would enhance adaptation to drought. Strengthening on-farm planting of indigenous trees and enhancing forest access, in addition to enhancing the processing and value adding of drought products like

indigenous fruits, gums and resins, could also enhance the viability of forest-based livelihood options (Owuor et al. 2005; Eriksen et al. 2006b).

Social and cultural ties are not only at risk from exhaustion and dislocation during climatic disasters, but also critical to people's capacity to cope and recover from disasters. Social networks can be exhausted during flood and drought where these get the prime responsibility for providing emergency food and shelter in the absence of government emergency aid to affected populations. When households no longer have resources left to share with kin and friends, stealing and distrust have been observed to increase (Eriksen and Silva 2003). Distributing emergency aid in such a manner that social networks are not exhausted or severed is an important adaptation measure, therefore. Finding alternatives to massive relocation during floods is an important way of avoiding both increased vulnerability and poverty generation. In particular, any disaster interventions can take account of and preserve social and cultural ties.

Table 3. Measures that may address climate risk, adaptive capacity and vulnerability processes among the poor: examples within four dimensions of poverty/basic needs

Dimensions of poverty	Climate risk to ways of securing needs	Coping and adaptation strategies to climate stress	Factors and processes causing vulnerability among poor
Income and material needs	<ul style="list-style-type: none"> • Climate risk assessment tools • Changing cropping patterns and herding practices • Planting windbreaks • Take climate change into account in designing roads to avoid cutoff during floods • Insurance mechanisms to replace lost productive assets • Plan for urban disaster management • Invest local taxes in local market facilities 	<ul style="list-style-type: none"> • Enhance urban employment opportunities • Strengthen reliability of channels for sending remittances • Improvement of storing techniques • Introducing diversified crops • Building foodgrain banks • Enable mobility across regional and international borders • Enhance access to common pool resources • Interventions carried out ensuring local income-generating activities 	<ul style="list-style-type: none"> • Enhancing on and off-farm conservation and access to indigenous plants • Reduce entry barriers to non-farm livelihood activities • Enhance market position of economic activities adjusted to local climatic conditions • Reduce conflict, disease outbreaks that reinforce effect of climate stress on livelihoods • Address barriers to technology access • Enhance local energy sources
Health and basic education	<ul style="list-style-type: none"> • Plan for climate variability for water supply and sanitation • Restoration of infrastructure after floods • Adjust school fee timing/system 	<ul style="list-style-type: none"> • Adjust education to labour needs and local diversification • Strengthen school feeding during drought • Reduce cost of health services • Promote links between indigenous and formal knowledge • HIV/AIDS treatment to enhance health status of infected people 	<ul style="list-style-type: none"> • Improving health infrastructure and capacity to deal with climate shock/change related illness • Enhance local education opportunities, including adult education programmes, including relevant climate and adaptation information • Enhance water supply and sanitation, suitable to local climatic variations
Rights and empowerment	<ul style="list-style-type: none"> • Formalise flexible tenure and rights systems adjusted to climatic variability and ensuring rights of the poor • Shift aid focus to longer term adaptation and reducing the need for emergency aid • Emphasise role of multiple stressors and contexts causing vulnerability in adaptation policies and vulnerability committees. 	<ul style="list-style-type: none"> • Strengthen local coping strategies that less powerful groups have access to • Strengthen local democratic participation in, for example, management of water • Increased collaboration between formal institutions and informal networks, such as women groups with traditional drought coping roles • Incorporate access to drought resources into conservation strategies 	<ul style="list-style-type: none"> • Address monopolisation of power by elites • Target mechanisms that lead to loss of rights and exclude groups • Strengthen rights to move across national boundaries • Installing transparent systems to gain access to land • Highlight 'non-climatic' drought factors • Strengthen customary rights (e.g. to biodiversity) and collective management of common pool resources
Social and cultural affiliation and security	<ul style="list-style-type: none"> • Active social network building and access by poor to networks of the non-poor • Disaster interventions to take account of social and cultural ties • Ensure social rights of all ethnic groups and both genders in drought and flood interventions and policies • Support infrastructure (roads and paths) that can remain open during floods 	<ul style="list-style-type: none"> • Distribute emergency aid in such a manner that social networks are not exhausted • Find alternatives to massive relocation during emergencies • Generation of local knowledge including that related to climate signals/forecasts and conservation of seed types, e.g. seed banks 	<ul style="list-style-type: none"> • Institutional reform or identify mechanisms to allow poor entry into social networks of non-poor • Address exclusion to drought/emergency resources based on gender/ethnicity/class etc • Link formal and informal knowledge systems to improve relevance of local knowledge to new geographic areas

4.3.3 Addressing the causes of vulnerability

Processes that are identified as driving vulnerability in a particular area, such as poor bargaining position in the market, loss of formal employment opportunities, or the spread of HIV/AIDS could be targeted to reduce vulnerability. The discussion in the previous section showed that the increasing need to diversify into non-farm livelihood options during drought, coupled with increasing marginality of such livelihoods, was a key cause of vulnerability in some contexts. In these cases, enhancing urban and rural employment opportunities that could be accessed by the vulnerable groups, and reducing barriers to the more viable off-farm income sources, constitute important adaptation measures. The processes that shape exclusion from such opportunities, including social marginalisation based on gender or ethnicity, as well as capital, education and skills entry barriers, could be addressed in such measures. It has been suggested that removing restrictions on the urban informal sector activities can reduce the insecurity, anxiety and humiliation of poor artisans, vendors and entrepreneurs, and the petty rents they otherwise have to pay to officials (Chambers 1995).

The investigation of vulnerability-adaptation linkages identified disempowerment as an important process shaping vulnerability of the poor. Empowerment is exemplified through enhanced rights to local biodiversity during drought and democratic participation in local development such as water provision projects, all important in securing needs in the face of climate stress (Owuor et al. 2005). At the same time, loss of access to important coping strategies through privatisation of resources could be counteracted through strengthened collective management of common resources. Democratic participation in local development included decision making and enhanced management of local water provision, important for the ability to cope with drought. Similarly, the 600 million urban dwellers living in informal and illegal settlements in Africa, Asia and Latin America are completely excluded from the formal regulatory systems of traditional urban planning. Innovation that can bring together informal and formal processes, state and citizen action and that encourage a socially responsible private sector is one way of doing this (Bull-Kamanga et al. 2003, Pelling 2003.)

Eriksen et al. (2006b) identify the strengthening of democratically elected peace committees and civil society as a critical adaptation measure in areas where conflict interacts with climate stress. These measures could be complemented with introduction of social welfare programmes or other efforts to lift people out of destitution and counteract processes of inequality and destitution, two key processes generating vulnerability in the study areas.

The case of vulnerability to malaria in the event of climate change presented in Olago (2005) illustrates the way that measures within the health policy and administrative management sector can contribute to adaptation among poor people. Increased temperature, along with poverty and lack of immunity, have increased risks of malaria at higher altitudes in East Africa. Poor households, and children in particular, often have no mosquito nets. In addition, poor are often unable to access adequate medical treatment during malaria epidemics. Measures to facilitate the use of nets among poor people would reduce the added risk of malaria due to climate change. Olago (2005) found that when a malaria epidemic occurs, three quarters of surveyed households sold their food crops to cover the cost of treatment, others borrowed money or relied on remittances, while some resorted to selling their land. These coping mechanisms may lead to an increase in food shortages, debts and material poverty. Strengthening alternative sources of income that could be sourced to pay for medical treatment would be a measure to strengthen coping and adaptive capacity and reduce the formation of poverty, therefore. Supporting traditional curative measures, such as local herbs for insect repellents and anti-malarials, would also strengthen local coping. Furthermore, strengthening social and physical infrastructure would reduce the vulnerability of poor people. The relative high cost, to poor people, of treatment, excluded many from accessing properly equipped and functioning health facilities and early diagnosis of malaria. Public health facilities were reported to often be overcrowded, staff unfriendly, and the long distances to public hospitals, poor infrastructure and high transport costs results in their limited usage by rural based communities.

4.4 Illustrating sustainable adaptation measures in ODA projects

In order to illustrate concrete ways in which development cooperation can integrate adaptation measures, we exemplify the three types of adaptation measures (risk reduction, strengthening adaptive capacity, and reducing vulnerability) in actual ongoing projects (table 4). Projects supported by Norwegian ODA were selected from nine different DAC sectors (DAC sectors in bold). Projects were selected that were all active in 2004 and whose theme was relevant to climate change adaptation. It is important to note that this project selection was carried out in order to exemplify the type of measures to consider in similar projects; it does not represent an evaluation of these projects or assessment of whether the projects could incorporate these measures in its cycle, for which a detailed examination of project documents would have been necessary.

Table 4. Adaptation measures exemplified in ongoing projects

Project	Potential climate risk measures	Potential adaptive capacity measures	Potential measures addressing causes of vulnerability
<p>1) Health policy and administrative management Malawi Health programme of work: Support to development of the health sector in Malawi through a Sector Wide Approach (SWAp)</p> <p>The SWAp Program of Work includes human resources, pharmaceutical and medical supplies, essential basic equipment, and infrastructure development as important components</p>	<p>Facilitate the use of mosquito nets among poor people in new malarial zones or areas with increasing malaria</p>	<p>Strengthening alternative, climate adapted, sources of income that could be sourced sourced to pay for medical treatment</p> <p>Supporting traditional curative measures</p>	<p>Strengthening social and physical infrastructure to enhance access by poor people of properly equipped and functioning health facilities and early diagnosis of malaria</p>
<p>2) STD control including HIV/AIDS National Aids Control Programme, Tanzania: Financial support for implementation of the National Aids Control Programme Medium Term Plan III</p> <p>The objectives are to:</p> <ul style="list-style-type: none"> • prevent transmission of HIV/AIDS/STDs • protect and support vulnerable groupsmitigate • the socio-economic impacts of HIV/AIDS 	<p>Food aid and support programmes to prevent poor people having to resort to prostitution as source of income during drought and other climate related emergencies</p>	<p>HIV treatment programmes to reduce the morbidity, loss of income, labour and medical expenses that undermine household coping strategies to drought and other climatic events</p>	<p>Enhance local livelihoods and employment opportunities adapted to a variable and changing climate to reduce splitting of households due to seasonal rural-urban migration and the spread of HIV/AIDS</p> <p>Strengthen social networks and local knowledge that are threatened as a consequence of disease</p>
<p>3) Agricultural policy and administrative management Cooperation with the Drylands Coordination Group Africa (Mali, Sudan, Ethiopia and Eritrea)</p> <p>DCG aims to contribute to improved food security of vulnerable households and sustainable natural resource management in the drylands in Africa</p>	<p>Build seed banks to mitigate the loss of local seed varieties</p>	<p>Increase knowledge about mulching and other organic techniques</p> <p>Improve market channels for higher value organic products as well as niche drought crops, such as millet and dryland bioenergy crops</p>	<p>Strengthen the status of local knowledge about the management of dryland resources</p> <p>Address institutional systems and relations creating inequality in land distribution</p> <p>Invest in smallholder agriculture, creating parallel insurance mechanisms, technical extension and credit opportunities as those available to the commercial agricultural sector</p>
<p>4) Transport and storage Support to the rehabilitation of the Pinga Road in North Kivu, Democratic Republic of Congo</p>	<p>Incorporate new quality standards related to climate change, in particular concerning passability of road during floods</p>	<p>Ensure a route and side-roads that connect to important rural markets</p> <p>Create local employment opportunities through local hiring in all activities, with considerations for seasons and household labour shortages</p> <p>Include space for bicycles/carts/pedestrians in design</p>	<p>Support HIV/AIDS awareness among villages along the road</p> <p>Explore road design and management that may enhance local security</p> <p>Promote mobility and reduce remoteness</p>

Project	Potential climate risk measures	Potential adaptive capacity measures	Potential measures addressing causes of vulnerability
<p>5) Energy policy and administrative planning National Hydropower Masterplan II, Vietnam: Continuation of SRV-1083, National Hydromasterplan Study, Stage 1</p> <p>Objective: To provide Government of Vietnam with alternative power system development strategies to meet the long term power demand</p>	Take potential increases in floods and droughts into account	Parallel investments in solar and other alternative sources of energy available to poor households, in ways that are enabling alternative income generating activities	<p>Ensure power is made available to adjacent as well as distant rural populations and to poor as well as wealthier households</p> <p>Strengthen the power of adjacent communities in decisionmaking in the development of dams, with a focus on avoiding negative impacts on areas or resources that are important in local coping strategies with climate stress, such as forest areas or drought stream-flow</p>
<p>6) Water resources policy and administrative management Water Resources Action Plan, Zambia</p> <p>Strengthen and prepare for implementation of national policies and develop international/national/provincial/local strategies for water resources management, building upon recent initiatives, such as the National Water Policy, National Water Resources Master Plan</p>	<p>Take variability and longer term changes in runoff into account</p> <p>Include measures to ensure provision of safe water during drought and floods</p>	Promote diverse water sources, extending provision in distant and drought-prone areas	<p>Ensure equitable water rights and strengthen systems for management of common resources, especially during seasonal or drought induced scarcity</p> <p>Counteract privatisation of water and local monopolisation of water sources and access</p>
<p>7) Environmental policy and administrative management Mara River Basin Management</p> <p>Facilitate participatory and sustainable integrated river basin management for conservation, sustainable and equitable use of freshwater resources in the Mara River Basin, shared by Kenya and Tanzania</p>	<p>Assess potential damage by flooding and drought and mitigating measures</p> <p>Control any increase in invasive alien species</p>	Ensure system of access to drought resources by local populations, both to forest, fish and water resources	<p>Enhance local empowerment in management of river basin</p> <p>Promote conservation and planting of indigenous species adapted to climate variability</p> <p>Provide technological assistance and credit to local initiatives processing and adding value to fish or forest products</p>
<p>8) Business services Enterprise Uganda</p> <p>The aim of the project is to build institutional capacity for, as well as to support, the promotion of entrepreneurship development through the establishment of Enterprise Uganda and by working directly with small and medium enterprises (SMEs)</p>	Ensure secure alternatives for power sources, such as during drought-induced power shortages	<p>Reduce entry barriers to business opportunities, in urban and rural areas</p> <p>Institute programmes to enhance the skills of poor and their entry into business networks of the non-poor</p>	<p>Reduce restrictions on informal businesses</p> <p>Create business opportunities that are suited to seasonal variations and climate variability</p> <p>Minimise social and economic exclusion from business opportunities (e.g. due to gender or ethnicity)</p>
<p>9) Industrial development Growing Sustainable Business for Poverty Reduction in Tanzania.</p> <p>The agreement seeks to contribute to poverty reduction and sustainable development by promoting and facilitating sustainable business and investments by the private sector through a process of multi-stakeholder engagement</p>	Strategies to ensure continued operation during continued operation during power shortages and alternative sources of energy	Create employment opportunities suited to seasonal migrant labour	Promote employment contracts that are favourable to seasonal workers

5. Analysis of past studies and screening regarding climate change adaptation in development

In this section, we investigate how poverty adaptation linkages have been addressed in development aid so far. We undertake comparative analysis of portfolio-screening efforts commissioned to date by the following five agencies: the World Bank (Burton and Van Aalst, 1999, 2004a,b), the German Technical Co-operation Agency (GTZ; Klein 2001; Kasperek 2003), the Organisation for Economic Co-operation and Development (OECD; Agrawala and Berg 2002; Agrawala 2004b, Agrawala et al. 2003a-d, 2004a,b), the Norwegian Agency for Development Co-operation (Norad; Eriksen and Næss 2003) and the Swiss Agency for Development and Cooperation (SDC; Robledo et al. 2006).¹ These five agencies have made the results of their portfolio screenings publicly available. The analysis focuses on the aims, activities, scope, findings and recommendations of the five screenings so as to identify challenges for the mainstreaming of adaptation.

5.1 Overview of portfolio screening efforts

Burton and Van Aalst (1999) conducted a review of climate change considerations in World Bank operations, examining six projects and six countries. The projects and countries were selected so as to “(...) illustrate a wide range of situations both with respect to the nature of climate risks and the level of development, as well as regional diversity” (p. v). The aim was to examine implications of climate change for World Bank operations. Three issues were given particular emphasis: (i) the vulnerability of projects to climate change, (ii) the impacts of projects on vulnerability, and (iii) implications of institutional roles within the UNFCCC and GEF for the World Bank’s activities. The projects were examined on the basis of whether and how they discussed climate risk, “[comparing] the project reports with known climate risks facing the project or the country” (p. 11). The country review discussed criteria for assessing climate exposure vis-à-vis climate change, the sensitivity of the World Bank’s portfolio to climate change and the coverage of climate change in the Country Assistance Strategies (CAS). Burton and Van Aalst (1999) found that climate risks were not well assessed at the project level. Climate risks were rarely mentioned in the project documents, even in areas with high current climate risks such as floods and cyclones. Interestingly, climate risks often emerged in implementation documents, which the authors suggest is because climate is “seen as a risk to project implementation rather than to long-term sustainable operation” (p. 12). In the countries reviewed, climate change was not discussed at all within the CAS.

Klein (2001) reviewed German-funded ODA projects in Africa within the area of natural resources management, with the aim of (i) identifying to what extent projects already considered the risk of climate change, as well as opportunities for adaptation, (ii) exploring opportunities to incorporate adaptation to climate change in future projects, and (iii) providing a starting point for awareness raising on the needs and opportunities for adaptation amongst government staff. A total of 136 projects were reviewed in order to establish whether or not they considered climate change or weather and climate-related stresses in their project documents. None of the project documents referred explicitly to climate change, and attention to weather and climate-related stresses was found to be low and primarily reactive. Five projects were selected for in-depth review of project documents and interviews with project managers. These projects were selected on the basis of their no-regret adaptation potential and their opportunities for generating secondary benefits (i.e., benefits not related to the primary purpose of the project). The in-depth review showed that climate change consideration was lacking even in areas where climate factors posed obvious risks today. Project staff indicated that climate change was not seen as relevant to immediate concerns such as health and clean water, and some considered it an “unnecessary burden on their projects” (p. 30). The study concluded that “[the] limited consideration of climate-related stress is striking in light of the intricate balance between the productivity of Africa’s natural resources and prevailing climate conditions” (p. 9). A follow-up to the report involved a questionnaire survey for agency staff (Kasperek, 2003). It confirmed that climate change was hardly discussed in project preparation, but at the same time it revealed that a majority of agency staff would like to have more information and support to integrate adaptation to climate change in their work.

A report by Eriksen and Næss (2003) for the Norwegian Agency for Development Co-operation (Norad) aimed at reviewing links between Norwegian development co-operation and adaptation to climate change, identifying entry points at the strategic and operational level, as well as recommending strategies for future integration. Overall, the direct reference to climate change in development policies and strategies was found to be negligible and largely framed as a mitigation concern. For example, Norway’s poverty reduction action plan under the MDGs only mentions climate change in relation to the country’s moral obligation towards developing countries for the responsible management of the climate as a global public good. No further details are given on what this might mean in prac-

tice. The review did not look at specific programmes or projects, but feedback from senior staff suggests that there had as yet been little or no discussion of climate change in relation to Norads work. The report identified a number of areas where climate change could be integrated without any major changes to current goals or working modes.

The Development and Climate Change project of OECD seeks to identify synergies and tradeoffs involved in mainstreaming climate change in development assistance. The project has, amongst other activities, carried out country case studies in Bangladesh, Egypt, Fiji, Nepal, Tanzania and Uruguay, with a focus on adaptation (Agrawala et al. 2003a-d, 2004a,b). The reports identified key priorities for adaptation on the basis of assessments of recent trends, climate change scenarios and potential sectoral impacts. In addition, donor portfolios were analysed for the proportion of projects affected by climate risks, and the studies conducted in-depth analyses of key resources potentially affected by climate change. Amongst the findings were that climate risks and climate change are largely missing in project documents, although a large share was considered to be affected by climate risks (typically 20-30% or more of the monetary value and number of projects). In Bangladesh it was found that climate change had been given a “fair degree of interest” by sectoral planners (Agrawala et al. 2003b, p. 28). However, attention to climate change was largely absent in higher-level policy documents, including the World Bank’s CAS (Country Assistance Strategies). Key recommendations were that (i) adaptation should be part of the “core development activity” (i.e. funded as part of ODA) rather than financed under the international climate policy regime, and (ii) the focus of adaptation should move beyond improving the ability to adapt to current weather extremes and climate variability (Agrawala, 2004a).

Robledo et al. (2006) conducted an assessment of the potential effects of projects and programmes financed by the Swiss Agency for Development and Cooperation (SDC) on vulnerability to climate variability and change, based on an inventory of issues by SDC (2005).² This assessment was based on the thesis that previous projects in natural resource management could have had unintended positive effects regarding both mitigation and adaptation, as well as promoted the conservation of biological diversity. The assessment addressed three levels: (i) understanding and preparedness at the national level, (ii) impacts and vulnerability at the local level, and (iii) main barriers to the implementation of mitigation and adaptation measures. Robledo et al. (2006) identified three different ways

in which adaptation could be mainstreamed: thematic, methodological and related to the implementation of concrete measures. In addition, they identified three thematic areas in which action is considered necessary: institutional development for adaptation, the role of technology transfer in adaptation and capacity building for adaptation. At the methodological level Robledo et al. (2006) identified the need to improve climate forecasting at the local level. In addition, the report recommended investing efforts in the development of tools to plan adaptation measures as a key element of development projects and programmes. Finally, they suggest that pilot projects to implement adaptation measures need to focus on both the natural and the social system and encourage the empowerment of local communities.

5.2 Analysis of findings

The five screenings reveals a number of challenges for identifying effective options to support the mainstreaming of adaptation into ODA. Findings from the different screenings show many similarities (Table 5). For example, all screenings concluded that current attention to climate change in the respective agencies’ development policies, projects and programmes was low. Importantly, it was found that the agencies had made few or no links to climate change even in areas where climate is already posing considerable risks and where comparatively small changes could have potentially large impacts. In addition to potentially overlooking direct impacts of climate change on projects and programmes, the omission could also adversely affect development by limiting the options for vulnerability reduction in the future. For example, Agrawala et al. (2003d, p. 27) noted in the case of Nepal that “(...) some opportunities for vulnerability reduction may well be missed” by not considering climate change.

Another common finding was that a link to poverty reduction was missing: where mentioned, climate change was mainly framed as a question of mitigation and largely as an environmental issue, not as a development concern. The lack of attention to climate change was also reflected in staff attitudes to climate change described by Klein (2001). Whilst there seemed to exist a broad consensus at the policy level in support of mainstreaming adaptation into ODA, attitudes at the project level ranged from a lack of awareness of what mainstreaming would mean in practice to scepticism about an issue not seen as part of the agency’s normal mandate or even related to development priorities. Climate change continues to be the responsibility of environment departments in development agencies (which also commissioned most of the screenings to date).

Table 5. Overview of selected portfolio-screening efforts to date

Agency (references)	Main goals	Activities	Scope	Key findings	Recommendations on mainstreaming
World Bank (Burton and Van Aalst 1999; 2004a,b)	Examine what climate change would mean to World Bank operations	<ul style="list-style-type: none"> - Countries and projects selected to illustrate wide range of situations - Projects assessed for whether and how they discussed climate risks - Countries assessed for range of climate risk criteria, sensitivity of portfolio and climate change coverage in CAS 	Policies and programmes, in-depth review of six projects and six countries	<ul style="list-style-type: none"> - Little or no attention to climate change at project level, even where climate risks are obvious today - Climate seen as a risk to project implementation, not long-term sustainable development - No mention of climate change in CAS 	<ul style="list-style-type: none"> - Knowledge base for climate risk management and a routine screening tool for projects
GTZ (Klein 2001; Kasperek 2003)	<ul style="list-style-type: none"> - identify current consideration of climate change, opportunities for integration in future projects and awareness raising; - identify relevant sectors and priority measures for adaptation 	<ul style="list-style-type: none"> - Projects selected on basis of potential for no-regrets and secondary benefits - 136 projects reviewed for whether or not they considered climate change - In-depth review of 5 projects; documents and interviews staff - Questionnaire to 330 ongoing projects 	<ul style="list-style-type: none"> - Project portfolio on natural resource management in Africa - Ongoing projects in climate-relevant sectors worldwide 	<ul style="list-style-type: none"> - No explicit consideration of climate change in 136 projects, also in areas with high current climate risks - Climate change not seen as important issue by project staff - Increasing interest in information on and support for adaptation and mainstreaming 	<ul style="list-style-type: none"> - Integrate indicators to evaluate climate adaptation in current routines for project design, identifying options that give immediate benefits and increase future flexibility - Analyse the adaptive effects of current projects - Develop guidance to consider climate change in the development of projects
Norad (Eriksen and Næss 2003)	Assess current level of climate change consideration, identify links between climate and development and recommend future strategies	<ul style="list-style-type: none"> - Review of policy documents for development co-operation, overall and within key priority sectors 	Development policies and strategy documents	<ul style="list-style-type: none"> - Negligible references to climate change. - Where mentioned, climate change framed as a mitigation issue - Many potential entry points 	<ul style="list-style-type: none"> - Detailed review of tools currently in use for project development and approval in order to identify ways to achieve synergies between climate adaptation and poverty reduction
OECD (Agrawala et al. 2003a-d; 2004a,b)	Explore synergies and trade-offs of "mainstreaming" climate change responses into development assistance, projects and plans	<ul style="list-style-type: none"> - Recent climate trends and climate change scenarios assessed to establish adaptation priorities - Donor portfolios analysed for proportion affected by climate risks - Donor strategies and projects assessed for attention to climate change - In-depth analysis of key resources potentially affected by climate change 	Policies, programmes and projects, in-depth review of six countries	<ul style="list-style-type: none"> - Climate risks and climate change largely missing in donor project documents - Where climate change mentioned, mainly in relation to mitigation - In Bangladesh, significant attention to climate change amongst sectoral planners, but little mention in higher-level policy documents or CAS 	<ul style="list-style-type: none"> - Adaptation should be part of core development activities rather than separately funded - Differentiated adaptation strategy with a focus on improving climate change considerations in the implementation process - Adaptation needs to move beyond current variability - Need for policy coherence and for operational tools
SDC (Robledo et al. 2006)	Assessment of potential effects of projects and programmes on vulnerability and adaptation	<ul style="list-style-type: none"> - Assessment of understanding and preparedness at the national level; impacts and vulnerability at the local level and main barriers to implement mitigation or adaptation measures 	14 projects and programmes in 9 countries in Latin America, Asia, Africa and Eastern Europe	<ul style="list-style-type: none"> - Action needed on (i) institutional development for adaptation, (ii) the role of technology transfer in adaptation, and (iii) capacity building for affected groups - Need to improve climate forecasting at the local level 	<ul style="list-style-type: none"> - Consider adaptation as a key element in development co-operation and differentiate recommendations into three levels: (i) thematic, (ii) methodological, and (iii) concerning implementation of adaptation measures

At the same time, the screening reports themselves gave little attention to other potentially important factors affecting the ability to mainstream adaptation into ODA. We argued in Section 2 for the need to go beyond a technology-centred approach to adaptation because of scenario uncertainties, limits to technology and the need to consider development priorities. Only Burton and Van Aalst (2004b) discussed explicitly how different views on adaptation could present a barrier to mainstreaming. Distinguishing between a “Convention Perspective” and a “Development Perspective” to adaptation, they note that “[t]he initial dominance of the Convention Perspective may be one reason why Task Managers at the Bank (...) are sometimes hesitant about embracing the notion of climate change adaptation as enthusiastically or as urgently as we would suggest.” (p. 40). Further, there is little discussion of the conceptual

links between poverty and vulnerability. Whereas it is frequently emphasised that the poorest are the most vulnerable to climate change, none of the screenings provide much analysis of the potential synergies and conflicts between poverty reduction and vulnerability reduction. As a result, it remains unclear what new challenges may be associated with climate change and how adaptation could include activities that would differ from ongoing poverty-reduction priorities and activities. In addition, little attention was given to the *process* by which mainstreaming could take place, beyond references to the need for awareness raising and capacity building on climate change within agencies. Further detail regarding the advantages and disadvantages of different methodologies used for screening can be found in Klein et al. (2005).

6. Institutional barriers and opportunities to undertaking adaptation measures

Presentations regarding different agencies' mainstreaming of climate change were discussed at the Workshop on Climate Change and Poverty, Oslo, 9-10 January 2006 (Ulsrud and Eriksen 2006) in order to reveal the institutional barriers and opportunities to integrating adaptation in development and poverty reduction measures.

Until recently, national and international climate policy focused primarily on mitigation. This is still reflected in many of the institutions relevant to the negotiation, design, implementation and funding of climate policy. Adaptation differs from mitigation in that it, amongst other things, does not produce global benefits, does not allow for easy comparison of the cost-effectiveness of alternative options, is relevant to a large number of socio-economic sectors and is therefore strongly interlinked with ongoing sectoral activities and natural disaster risk reduction. Section 2.2 presented the case for mainstreaming adaptation into development planning and ongoing sectoral decision-making. However, the current formal institutions for climate policy, which have been designed for mitigation, appear to have hindered rather than facilitated such mainstreaming.

At the global level the key institutions for climate policy are the UNFCCC, its Kyoto Protocol and its financial mechanism, the Global Environment Facility (GEF). The GEF spends approximately USD 250 million per year on mitigation (energy) projects in non-Annex I countries. Annex I countries invest an additional USD 500 million per year in mitigation projects under the Clean Development Mechanism (CDM). In contrast, the GEF spends approximately USD 25 million per year on adaptation, mostly on preparatory activities and capacity building (Ian Noble, pers. comm.).

Several articles of the United Nations Framework Convention on Climate Change (UNFCCC) set out the provision for considering sustainable development in climate policy, yet it is uncertain whether or not reducing vulnerability to climate change by means of development can be pursued as a strategy within the context of the UNFCCC (Burton et al. 2002; Klein et al. 2005). A climate risk approach to adaptation, which aims to reduce vulnerability to both natural climate variability and human-induced climate change, for example, does not make a distinction between impacts based on whether they are the result of climate variability or climate change. This presents a challenge to the application of the GEF funding rules to adaptation projects. The GEF, as the financial mechanism of the UNFCCC, is to fund only those activities that have become necessary in the light of climate change. Reducing the risks of natural climate variability is

seen as the responsibility of national governments, and financial support for such risk reduction should come from different sources, such as bilateral funding.

The National Adaptation Programmes of Action (NAPAs) have been introduced as a way of ending the stalemate between developing countries (especially the least-developed countries; LDCs) requesting increased sources of funding for adaptation, and Annex I countries uneasy with the prospect of paying for activities that are seen as not being part of adaptation to climate change. UNFCCC decision 28/CP.7, which established the NAPAs, recognised the need to consider climate variability along with climate change:

"The rationale for developing NAPAs rests on the low adaptive capacity of LDCs, which renders them in need of immediate and urgent support to start adapting to current and projected adverse effects of climate change. Activities proposed through NAPAs would be those whose further delay could increase vulnerability or lead to increased costs at a later stage."

It is expected that financial support for adaptation to climate change will comprise a combination of funding from the aforementioned three adaptation funds (Section 2.1), the new GEF Strategic Priority Piloting an Operational Approach to Adaptation (SPA) and bilateral and multilateral funding.

The increased involvement of development agencies and NGOs in adaptation policy since 2001 has given an impetus to discussions on mainstreaming adaptation into development planning and ongoing sectoral decision-making. It appears that a broad consensus has emerged that mainstreaming adaptation is the most desirable way of reducing the vulnerability of people in developing countries to climate change. There is indeed an emerging consensus amongst funding agencies, as will be reflected in the OECD Declaration on Integrating Climate Change Adaptation into Development Co-operation, adopted at a joint development and environment ministerial meeting in April 2006. However, concerns about mainstreaming have been voiced within developing countries and amongst academics. On the one hand there is concern that scarce funds for adaptation in developing countries could be diverted into more general development activities, which offers little opportunity to evaluate, at least quantitatively, their benefits with respect to climate change (Yamin 2005); on the other hand there is concern that funding for climate

policy would divert money that is meant to address challenges seen as being more urgent than climate change, including water and food supply, sanitation, education and health care (Michaelowa and Michaelowa 2005).

These concerns, along with the inevitable scarcity of funds, present a challenge for the current institutions involved in adaptation policy. It is widely felt that there is a need to develop a new international adaptation policy regime that can respond more effectively to adaptation needs in developing countries, for example by laying out more clearly the respective responsibilities of the various actors involved. A new adaptation regime, which may or may not be part of a comprehensive post-2012 climate policy regime that includes mitigation, would need to remove existing barriers to linking adaptation with development. Priorities and criteria for adaptation funding need to reflect existing needs in developing countries, funding should become more accessible and funding levels need to be increased. In addition, formal and informal mechanisms for exchange of information between policymakers, practitioners and academics need to be fostered and supported.

The fact that adaptation has been mainly seen as an environmental issue is one of the main institutional barriers to mainstreaming within development agencies, where adaptation has been treated as an extension of mitigation. As a consequence of this, most agency personnel do not think of climate change as a development issue. Both in donor and recipient countries environment ministers, rather than finance and planning ministers have ownership of the climate change issue. Norad illustrates a fairly typical pattern in ODA where all climate change activities are carried out by an environment team. Such an institutional placement of climate change further hinders its mainstreaming since environment in itself is often not a priority with development agencies. In addition, ODA agencies often focus on a few sectors per recipient country, and countries in which environment is not a focus sector therefore do not receive support for climate change measures. The lack of focus on adaptation and bias towards mitigation has been reinforced by patterns of knowledge transfer. Because climate change is a relatively new and often minor issue within ODA, activities are dependent on individuals with personalised knowledge and their links within the organisation. In the absence of institutionalisation of knowledge, momentum and awareness cannot be maintained when key staff leave or change positions within the organisation. In addition, individuals that have generated climate change focus often have an energy background. As a consequence, within the GTZ, for example, the climate change programme has traditionally had good links with energy programmes, but less close links with rural development and poverty reduction programmes within the organisation. In order to effectively integrate climate change adaptation in development activities, there is a need to rephrase adaptation as a development issue, foster new institutional linkages and overcome scepticism among those in ODA not dealing with environment.

The UK illustrates the importance of high level buy-in and political prioritisation of environment and climate in integrating it in development aid. The Prime Minister of the UK, Tony Blair, taking personal interest in climate change was an important factor in getting climate change widely onto the policy agenda. In Norway, climate change has not previously been prioritised in development cooperation, partly because mitigation was not seen as relevant to the poorest countries targeted by ODA. More emphasis is currently placed on climate change, however.

Past experiences of climate work in ODA have shown that it has been easier to get mitigation on the energy agendas than to get adaptation on the agenda. While mitigation involves fairly specific technological measures, adaptation is more complex and multi-dimensional. Non-experts have trouble visualising and understanding adaptation, as well as concretising measures and therefore easily distance themselves from it instead. While CDM involves public-private partnership and 'photogenic' projects, initiatives such as NAPAs are seen as less informative and yielding less concrete output. Past efforts to mainstream adaptation to climate change in operations, that have taken place, such as by Danish and German ODA, have focused mainly on climate and disaster risk management. Risk assessment has been found to be a more useful tool than environmental assessment and assessing climate risk of a project appears relatively concrete to staff. Checklists for adaptation in development projects allow learning by doing, which has been found to be effective. Less attention has been paid so far to how coping and adaptive capacity at a village level and the factors causing vulnerability can be addressed. These largely emphasise climate risk, and there is a need to also develop checklists that include the multiple stressors generating vulnerability. The exchange of experiences and development of tools to develop practical tools for addressing these issues have been hampered by a lack of practitioner-academic dialogue, due to the ad hoc and irregular nature of such meetings. In addition to continuing dialogues regarding adaptation with institutions, the Oslo workshop discussions suggested that maintaining an international forum for discussion of adaptation is important for academic-practitioner interaction.

When the need for increased efforts in adaptation funding was beginning to be recognised and the potential role of development agencies became apparent, knowledge of adaptation amongst these agencies was still limited. In response to the emerging need for information, the Vulnerability and Adaptation Resource Group (VARG) was established in October 2001. As an informal platform for information exchange between resource persons and representatives from development agencies, the VARG has been instrumental in enhancing the knowledge base on adaptation and its links with development. The Oslo workshop reiterated the need for such a forum maintaining its informal character of academic-practitioner exchange while increasing the regularity of meetings.

The Netherlands Red Cross established a Centre on Climate Change and Disaster Preparedness in June 2002 seeking to address the need for a centre of expertise on the relationships between climate change and natural disasters. The centre has since worked to connect practitioners, academics and policymakers working in the fields of climate adaptation and disaster preparedness, and has thus been very effective in raising awareness of the need for and opportunities to integrate the two activities. Together with others it has also been successful in sensitising traditional development organisations (e.g. Oxfam, ActionAid, Tearfund, Practical Action) to climate change and the need to adapt to its impacts.

The awareness of climate change within agencies is increasing, especially within GTZ due partly to its featuring in specific project performance review, but there is still a lack of knowledge on how to address adaptation. Mainstreaming costs money and takes personnel time, and if funding is not provided, climate change is easily seen as another burden. In some cases, however, climate change mainstreaming is seen as positive by project managers because it increases the significance and visibility of their own project. It was suggested that a tool or 'roadshow' is needed to explain how to implement adaptation in order to make such measures more tangible. Within Norwegian development cooperation, personnel working on PRSPs

are an entry point to integrating adaptation in development, requiring basic and non-complex information on adaptation. Reaching colleagues who are not climate change experts is a first step as this enables them to refer further work to experts where necessary. While formal procedures for knowledge management exist, effective knowledge transfer, which is often face to face, is needed. Forums for discussing adaptation within development organisations are so far largely lacking and ad hoc.

Such internal awareness raising can also address another barrier to adaptation, that is, its lack of prioritisation in recipient countries. In these countries, too, adaptation is often institutionally placed within environmental departments and while forming part of international climate change negotiations, it is seldom promoted as part of national development policies. Past studies similarly show that it is important that locally determined adaptation needs are linked "upwards" to national and international policy and institutional structures, for which some kind of procedural and institutional frameworks are needed (Yamin et al. 2005). Embassy and country office agency staff that are aware of climate issues can more effectively place adaptation on the agenda in bilateral dialogues regarding a country's development priorities, for example in PRSPs.

7. Conclusions and recommendations

In this report, we have tried to identify the linkages between poverty and adaptation to climate change, and how these linkages can be addressed in development aid. Taking the OECD/DAC definition of poverty as a starting point, the analysis has been based on an understanding of poverty as a process and vulnerability as the contextual conditions of social and ecological systems that shape responses and outcomes from climate variability and change. It would be beyond the scope of a single report to attempt to describe all the ways that poor people secure needs, adapt to climate stress, or all factors and processes affecting their ability to do so. Instead, it is precisely the critical role that this diversity and dynamism plays in how measures to adapt to climate change can be carried out as part of development efforts aimed at poverty eradication are formulated that we have sought to demonstrate. We propose that such measures can target the interface between vulnerability and poverty. There are three types of measures that will effectively target this interface. These are:

- those that target the risk posed by climate change to poverty, such as to destruction and functioning of water and social infrastructure and viability of cropping systems and other sources of livelihoods
- those that aim to strengthen the capacity to cope and adapt to climate stress, such as engaging in alternative sources of income during drought, accessing forest products, or seasonal movements of livestock for grazing
- those that target the causes of vulnerability, such as poor market relations in trading in niche drought products, or poor health facilities and the spread of infectious diseases such as HIV/AIDS and ensuing household labour scarcity.

We have exemplified several measures that may contribute to adaptation. These should be regarded as an exemplification of an approach rather than a prescription, however. In order to identify the particular risks, adaptive strategies and causes of vulnerability to target in each case, analysis needs to be context-specific. It is critical to understand, in any given context, both how people secure the four dimensions of a decent life (material needs, health and education, rights and social and cultural affiliation), the processes that shape failure in securing needs, the way that climate change poses a risk to people's strategies, the particular ways that people cope and adapt to climate stress, as well as the main causes or drivers of their vulnerability.

Our findings have three important implications for adaptation to cli-

mate change in development aid activities. First, adaptation is essentially a social development issue in addition to an environmental and technological issue. Adaptation and poverty reduction are not the same thing, although they overlap. Not all poverty measures necessarily contribute to adaptation and equally if not more important, adaptation measures do not automatically contribute to poverty reduction. Unless the specific context of the poor is taken into account, adaptation may in fact increase the vulnerability of the poor. Adaptation targeted at the poor involves a range of specific measures, summarised above as three types of measures. Since one of the effects of vulnerability to climate variability and change is pushing people into poverty, including such pro-poor adaptation in development can enhance poverty reduction measures by increasing their social, economic and environmental sustainability. Although climate change seems marginal compared to the pressing issues of poverty reduction, hunger, health, economic development and energy needs, it is becoming increasingly clear that realisation of the poverty reduction goals can be seriously hampered by climate change.

Second, responding to uncertainty forms an important part of adaptation. Adaptation therefore does not entail a simple adding of a scenario of linear changes in average climatic conditions to present activities. Instead, it involves adding consideration of climate change vulnerability to present activities. This involves targeting the strengthening of adaptive capacity and addressing the causes of vulnerability, in addition to reducing climate risk. Climate change adaptation includes responding to variations as well as some new types of events and surprises, exemplified by Hurricane Katrina and the Peru-chill from Antarctic. There is a need to strengthen flexibility and adaptive management in order to face such surprises, in addition to any technological fixes that address predicted changes. A broader set of measures is required than that which has been the focus of adaptation so far. However, there may be some impacts of climate change to which we will not be able to adapt, illustrated by the dramatic effects of hurricane Stan. This further underlines the need to address the mitigation of international greenhouse gas emissions in addition to adaptation.

Third, climate risks, local capacity to adapt, and causes of vulnerability are all place-specific. Therefore, sustainable adaptation measures must be place specific, and there are no one-size-fits-all solutions that will contribute to both vulnerability reduction and poverty reduction. This places new demands on ODA staff to analyse the character of vulnerability of a given development context and identify

the types of measures that are appropriate. We demonstrate a three-step approach for carrying out such analysis.

Analysis of past efforts by bilateral and multilateral agencies to mainstream adaptation into development reveals that there are several institutional barriers to incorporate adaptation measures into poverty reduction. The locating of adaptation institutionally within environmental departments as an add-on to mitigation of greenhouse gases has led to adaptation being isolated as an environmental problem rather than as a wider development issue with implications for practically all development activities. The low greenhouse gas emissions in most developing countries have placed mitigation and climate change, and as a consequence also adaptation, low on the development agenda. There is very little consideration of climate change adaptation in most development aid programmes. Where such considerations exist, they have so far focused mainly on disaster and climate risk management, while strengthening local adaptation strategies and addressing causes of vulnerability are largely ignored.

Despite these institutional barriers, there are several opportunities that, when realised, may enhance the mainstreaming of climate

change adaptation. The inclusion of adaptation may raise the visibility of a project politically and within an organisation. Adaptation provides an opportunity for new types of development interventions at a local level that more effectively enhance the achievement of basic needs for a decent life, reduce inequalities and address environmental problems. The lessons made in the 1960s and 1970s within development aid regarding the need for a range of social measures in addition to technological assistance make these organisations particularly well placed to ensure that the same mistakes are not repeated in the shaping of adaptation measures. Increased participation of development aid agencies is therefore critical in international and national forums currently discussing the formulation of adaptation measures, such as the climate change conventions and national climate change focal points. Raising awareness and understanding of the poverty-adaptation linkages within a development cooperation organisation, in particular among country office staff and those dealing directly with project management, may enable placing pro-poor adaptation on the agenda in bilateral negotiations regarding development cooperation.

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Global Environmental Change and Human Security (GECHS)

GECHS is a core project of the International Human Dimensions Programme on Global Environmental Change. The goal of GECHS is to promote an understanding and recognition of global environmental change as an issue of equity, sustainability and human security. We situate environmental changes within the larger socioeconomic and political contexts that cause them, and which shape the capacity of communities to cope with and respond to change. Our research focuses on the way diverse social processes such as globalization, poverty, disease and conflict combine with global environmental change to affect human security.

GECHS International Project Office

Department of Sociology and Human Geography

University of Oslo

P.O. Box 1096 Blindern

N-0317 Oslo, Norway

Tel.: +47 22 84 43 86

Fax: +47 22 85 52 53

info@gechs.org

www.gechs.org