

Vulnerability and adaptation to climate change: New challenges for poverty eradication

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We would like to thank Lars Otto Næss and Turid Hallstrøm for useful comments on an earlier draft of this chapter. The responsibility for views and any errors in this chapter rests with the authors, however.

1. Introduction

It is no longer possible to ignore climate change adaptation as an element in development work as there is a serious danger that climate change in the form of more extreme droughts, floods and storms, sea level rise and more intense rainfalls will undermine development interventions, millennium development goals and increase poverty (Schipper and Pelling 2006, IPCC 2007). Adaptation to climate change is the adjustment of practices, processes and structures to reduce the negative effects and take advantage of any opportunities associated with climate change. Although greenhouse gas emissions need to be reduced to mitigate climate change and avoid future human suffering, adaptation to climate change is also necessary. We are already committed to some extent of human-induced climate change over the next decades because of past greenhouse gas emissions. Furthermore, societal changes such as privatisation of natural resources, declining health, and conflicts and insecurity are in some instances making populations increasingly vulnerable even to present climatic variability such as seasonal droughts as well as extreme events. This is because these developments may have placed people's livelihoods at the brink of collapse or undermined their existing adaptation strategies.

These same societal processes are likely to make populations equally, if not more, vulnerable to future climate changes. In this chapter, we focus on vulnerability to climatic variability and change since people who are vulnerable to climatic variability are likely to be vulnerable to future changes, and since future changes in average conditions to a large extent will involve an intensification of present variability and extremes. Many serious problems have arisen because climate conditions and variability have been ignored in development projects, and many societies are not well adapted to their current climate, thereby even less prepared for additional climate change.

This chapter suggests that the issue of climate change should be treated as an issue of development which is relevant to all sectors of society since these all affect people's vulnerability and their ability to adapt to climate variability and change. It should be noted that not all poor people are necessarily vulnerable, and non-poor people can also be vulnerable, in industrialised as well as in developing countries. In this chapter, we focus on the vulnerability of poor people in developing countries because of the specific challenges that they meet, and we highlight that adaptation to climate change among poor people will involve measures that differ from conventional poverty eradication measures. We suggest that development and poverty eradication efforts need to make specific considerations of the vulnerability of their target groups and enhance the ability of these groups to adapt to climate variability and change. Poverty can thus be reduced in ways that may be more effective than the current strategies..

2. Who is vulnerable to climate change and why?

In order to identify the implications of climate change for poor people and poverty eradication strategies, it is important to understand the context of poor people's lives. The social and ecological conditions within which people live influence the way they are affected by climate change. The causes of vulnerability to climate change are therefore to a large extent societal and resulting from political and economical in addition to environmental processes. Social and ecological conditions that influence poor people's lives and can make people vulnerable to climate change include lack of access to basic social services, loss of employment opportunities, lack of empowerment to participate in political processes, violence and insecurity as well as environmental degradation and loss of access to important natural resources. Simply stated, the range of other challenges that people face besides climate influences the ways in which they can manage and adapt to climate related problems. This means that people are in a pre-existing or inherent state of vulnerability which can lead to severe negative effects (such as loss of lives and property, hunger and reduced health) when a particular change in climate conditions strikes.

Since it is very dependent on the local context, the degree of vulnerability varies between individuals and social groups as well as over time. Some people in areas that may experience relatively less dramatic physical changes in the climate can be more vulnerable to climate change than other people who experience more severe changes in the climate but for whom the social and ecological conditions are more favourable. There is little doubt that sea level rise leading to erosion and inundation of farmlands and settlements leads to some extreme effects of climate change. However, groups for whom incomes from farming and fishing have been steadily falling due to market conditions and ecological decline may feel equally severe effects when faced by a relatively slight increases in the incidence of droughts or ocean temperatures. Poor people differ in their vulnerability because they differ in their livelihood strategies, social and political relations, and the types of stressors to which they are exposed, and they differ in their attempts and capacity to adapt to changing conditions (Coetze 2002).

It can therefore be misleading to describe whole regions as particularly vulnerable to climate change. For example, Africa is described as very vulnerable to climate change because of a high dependence on natural resources and because large poor populations live in marginal (drought or flood-prone) climates. In addition, many African countries' capacity to adapt to climate change is said to be limited by a lack of resources, poor institutions and inadequate infrastructure (Smith et al. 2003). There is no doubt that many people in Africa are vulnerable. In specific, many poor people are vulnerable to climate change, and droughts or floods can indeed force individuals and families into destitution (Lind and Eriksen 2006). However, rather than categorising all poor countries and all poor people as vulnerable, it is more useful to focus on which specific populations are vulnerable and why they are vulnerable. For example, people outside the most flood or drought prone areas can be very vulnerable, including urban populations in informal settlements (Bull-Kamanga et al. 2003), and in a Mozambique, it was found that in some villages, the relatively richer households were the most vulnerable to the 2000 floods (Brouwer and Nhassengo 2006).

Table 1 exemplifies groups that, due to different social and ecological conditions, are vulnerable to climate variability and change. Why, for example, are some parts of urban populations especially vulnerable? First, all urban inhabitants are more or less vulnerable to extreme heat and following disease and deaths, as well as other types of extreme weather. Second, people living in informal settlements, such as the 2 million people living in slums in Nairobi, are in situations characterised by lacking or inadequate infrastructure for water, roads and sanitation, high exposure to health problems, only casual employment, high living expenses, and lack of simple techniques for water harvesting or organic toilet techniques (for composting of sewage) (Weru and Bodewes 2001). When flash rains, droughts, storms and extreme temperatures hit, as they increasingly do in this region, they will have more devastating consequences on the livelihoods, health and well-being of most of these people, compared to an imagined situation where they were not loaded by serious problems in the first hand. Many among the urban poor are also in an especially vulnerable situation because of heavily polluted air and water, seriously affecting their health. Furthermore, in box 1 below, the vulnerability of pastoralists in the rural drylands of Kenya is explained, illustrating the diversity of societal factors influencing the outcomes of severe droughts for poor people.

Table 1. Exemplification of vulnerable groups

Vulnerable group	Vulnerability context
Pastoralists with declining herds and incomes are vulnerable to drought and will be severely impacted by any increased incidence of drought and changing seasonality due to climate change	Insecurity, lack of government services, policies discouraging pastoralism, reduced access to drought grazing and water resources, conversion of grazing land into private farmland and ranches
Pastoralists with large herds in insecure areas are vulnerable to drought because seasonal grazing areas are unsafe and because conflict may decimate herds	Raids and thefts leading to loss of livestock and key grazing areas being unsafe, inadequate veterinary services making herds prone to disease, droughts, conversion of grazing land into private farmland and ranches
Small-scale farmers with no formal employment, especially women, are vulnerable to drought, floods, changing seasonality, melting glaciers threatening future water supplies as well as increased incidence of malaria and infectious diseases related to climate change	Poor land rights, little household labour, fluctuating prices for farm products, rising costs of farm inputs, little political influence, reorganization of water sector leading to loss of traditional water rights for small-scale irrigators, difficult to afford water fees, lack of access to useful farming techniques from relevant experiences in other places
Farmers in low-lying areas with little alternative land in higher areas or other income options may be vulnerable to sea level rise and salt water intrusion	Inability to access new land elsewhere or invest in alternative livelihoods when farmland is lost, low incomes in the informal sector, poor conditions in nearby slums, weakening social networks and declining assistance from relatives
Urban poor in informal settlements are vulnerable to flooding, flash rains, sea level rise and infectious diseases, all of which may intensify under climate change	Inadequate water, roads and sanitation infrastructure, few and inadequate disaster management polices, housing in areas prone to floods and landslides, high exposure to health problems, only casual employment, high living expenses, lack of simple water harvesting and storing devices
Orphans and old caring for orphans are vulnerable to droughts, floods, cyclones, increased incidence of malaria and infectious diseases	Lack of income, spread of HIV/AIDS, little household labour, loss of knowledge regarding adaptation strategies, lack of education, hunger, illness, destitution
Local inhabitants in areas affected by hydro-power projects are vulnerable to droughts and changing seasonality as livelihood options dwindle	Water diverted from side rivers, reduced access to pasture and forest products, relocation, loss of land and livelihoods
Small-scale farmers with few assets and deteriorating access to natural resources are vulnerable to drought, floods, changing seasonality, as well as increased incidence of malaria and infectious diseases related to climate change	Degraded ecosystems, loss of biodiversity, loss of natural resources, land rights and valuable trees, leading to lack of materials for handicraft and housing, lack of wild foods, fodder for animals, gardening plots, water for drinking, watering gardens and animals, opportunities for fishing, wood for cooking, increased risk of landslides, reduced protection against natural disasters
Unskilled urban workers are vulnerable to floods and intense rainfall that disrupt infrastructure, make it difficult to get to work and make living conditions difficult	Heavily polluted air and water, increasing health problems, declining numbers of formal jobs, weakening workers' rights
Small-scale fishers may be vulnerable to cyclones and loss of equipment, changing sea temperatures and fish stocks as well as drying up of freshwater lakes due to increased temperatures and increased extraction of water for irrigation	Insufficient income and market access to be able to re-invest in equipment and fish other species or in other areas, poor rights to ensure their own interests in competition with irrigation agriculture

Despite the high vulnerability to climate change among many groups of poor people, it is important to be aware of the distinction between poverty and vulnerability since development measures commonly used in order to reduce poverty do not necessarily reduce vulnerability to climate challenges. There are even well-documented cases of projects aimed at reducing poverty that have increased vulnerability to difficult climate conditions. Economic growth and technological change does not necessarily reduce vulnerability to climate variability and change, and can increase it. 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 (Adger et al. 2003; Klein et al. forthcoming).

Important causes of vulnerability to climate change, 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 be ignored in an approach that only focuses on poverty. Therefore, making some technological adjustments for extreme weather conditions, with the expectation that general poverty reduction will automatically reduce vulnerability to climate change is not sufficient. On the contrary, climate change adaptation should be addressed more broadly, through three types of measures. First, the efforts should reduce the direct risks of climate change, for example storms or flooding, to people's strategies to secure their material and non-material needs. Second, the ways that poor people cope with climate stresses in the short term and adapt their livelihood systems in the long term should be understood, facilitated and the opportunities broadened. Finally, the specific social and environmental factors and changes leading to inability to cope or adapt should be understood and addressed. In this way "sustainable adaptation measures" can be achieved, by reducing both poverty and vulnerability to climate variability and change at the same time (Eriksen et al. 2007).

Box 1: The relationship between poverty and vulnerability to climate variability and change in the drylands of Kenya

The relationship between poverty and vulnerability to climate related challenges is illustrated by the case of vulnerability among populations in drylands in Kenya (Eriksen et al. 2006a). Their current vulnerability to drought is instructive also to vulnerability to climate change. Drought has occurred from time to time in these areas and is not a phenomenon only related to climate change. However there is now evidence that droughts are increasing in African drylands and may increase further with climate change (IPCC 2007). Furthermore, factors that undermine current adaptation to drought are likely to cause vulnerability to any future changes in the climate, including an increase in drought or incidence in new types of events such as change in seasonality. In the research project conducted in Kenyan drylands, it was found that several processes had led to people being vulnerable to drought. Conflict and insecurity, loss of farmland through government gazettment, 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 in Kitui District being unable to access coping strategies during drought. The impact of drought, in particular in combination with conflict, had pushed some people into destitution and extreme poverty. In Turkana District, raids and insecurity, gradual conversion from nomadic pastoralism to settled farming or fishing, and drought, had made some people extremely poor. At the same time, it was not necessarily the poorest that had been the most vulnerable to these events. Both in Kitui and Turkana, some of the richer livestock owners had been targeted by raids; eviction from government lands and migration to areas safe from conflict led to loss of access to dry

season grazing and farm-lands for both rich and poor households; while some individuals from poorer households in Kitui had successfully started trading businesses that gave high drought incomes. Many of the destitute were unable to access opportunities from aid interventions, however, because such adaptations, such as planting new types of seeds, were premised on a minimum of capital investment and access to land and labour. The destitute would therefore need particular measures, such as social welfare measures as well as facilitation of participation in drought economic activities such as processing of local drought-resistant fruits, in order to adapt to climate change.

3. The main climatic change challenges faced by poor populations

The latest report from United Nations expert group on climate change, the Intergovernmental Panel on Climate Change (IPCC), concludes that it is very likely that most of the increase in temperatures over the past decades is due to human emissions of greenhouse gases. Changes in weather patterns related to this increase in global average temperatures have already been observed (IPCC 2007). Mountain glaciers and snow cover have declined all over the world. The warming of oceans and the melting of glaciers have together contributed to sea level rise. Precipitation has increased significantly in northern and central Asia while in the Sahel, southern Africa and parts of southern Asia, drying has been observed. In fact, more intense and longer droughts have been observed since the 1970s, particularly in the tropics and subtropics, influenced by higher temperatures and decreased precipitation. Heavy rainfall events have become more frequent, and hot days, hot nights, and heat waves have also become more frequent. With further increases in global temperatures of 1.1 to 6.4°C in this century, many of these trends are expected to continue. It is very likely (more than 95% likely) that hot extremes, heat waves, droughts and heavy precipitation events will continue to become more frequent. It is likely that future tropical cyclones (typhoons and hurricanes) will become more intense, with larger peak wind speeds and more heavy precipitation. The global sea level is expected to increase between 19 and 58 cm this century, mostly caused by warming of sea water (IPCC 2007).

Changes in global average climate conditions will manifest themselves in very different ways locally. Specific regional and local predictions are still difficult for climate experts to provide. One of the most critical uncertainties is the problem of predicting the effects of climate change on either the Asian monsoon or the El Niño Southern Oscillation (ENSO), which have great influence in east Asia, Latin America and southern and eastern Africa (Watson 1997, Mc Carthy et al. 2001). Nevertheless, there is little doubt that in sub-Saharan Africa, prolonged droughts represent an already observed and increasing challenge, along with other climate related risks like increased intensity of precipitation events, sea level rise and salt water intrusion. Other climatic events that are likely to increase in some areas of Africa with climate change include floods and resulting landslides, extreme storm events and tidal waves, reduced runoff and increased water stress. Some of the consequences are disruption of water dependent activities, reduced hydropower production, threats to arid and semi-arid ecosystems, and increased incidences of vector-borne diseases and reduced nutritional status (Joubert and Hewitson 1997, Hulme et al. 2001, Tyson et al. 2002). A warming may also lead to significant changes in forest and rangeland cover.

In Asia, sea level rise is a critical issue for large populations in coastal areas and islands. Inhabitants living on low-lying coastal plains are also at risk from floods, and displacement from the coastal zone. Rising temperatures in the region are likely to continue with global warming, becoming more pronounced in arid and semi-arid regions than in coastal areas (Watson et al. 1997; McCarthy et al. 2001). The effect on future rainfall is uncertain, but future climate change could have a profound impact on the monsoon, which underpins the rainfall regime. Melting of glaciers, with potentially dramatic consequences for downstream hydrology, ecology and human activities, as well as decrease in water supply, are other critical threats associated with climate change. In addition, droughts, cyclones and intense rainfall events, saltwater intrusion, and erosion are likely to continue to increase (Lebel 2002; IPCC 2007).

Different areas of Latin America are expected to experience increased droughts, increased floods and resulting landslides, heat outbreaks, forest fires and loss of coastal land and biodiversity. Mountain regions and plateaus play an important role in maintaining the continent's climate, and warming will affect the hydrological cycle and biodiversity, ecosystem shifts and the melting of glaciers. Glaciers are melting at an accelerated rate in the Venezuelan and Peruvian Andes. Rainfall may increase in some areas of the continent, such as north western parts (McCarthy et al. 2001). Climate change could have important implications for natural ecosystems (e.g. rangelands, wetlands), water resources, coastal zones, agriculture, and human health. Temperate grasslands will be negatively affected by drought, in which case livestock production is projected to drop dramatically. The combined effects of deforestation, fragmentation of habitats and climate change potentially pose a threat to the biodiversity of the region.

In all the three regions, damages to infrastructure and settlements, increased malnutrition, and increased geographic distribution of vector-borne diseases are among the risks that may increase with climate change. Shantytowns are at risk from floods and landslides, and sea level rise represents a threat through saltwater intrusion and coastal erosion. For example in the coastal nations of west, central and southeast Africa, coastal erosion is expected to steal land from settlements, cities and economic activities (McCarthy et al. 2001). The speed of change, as well as any increase in the unpredictability of weather patterns or frequency of extreme events, may pose the greatest demands on the capacity of people and communities to make adjustments. As mentioned earlier, a number of social and ecological conditions have made many individuals and groups vulnerable to current climate variability and future change. Some of the central challenges that may worsen under climate change are found within the three fields of water supply, agriculture and income generation, and health.

Water supply and drought

More than one billion people lack access to safe and affordable water. As highlighted in the Human Development report 2006, the global water crisis is not first and foremost about absolute shortages of physical supply. The report argues that the roots of the water crisis can be traced to poverty, inequality and unequal power relationships, as well as mistaken water

management policies that exacerbate scarcity (UNDP 2006). Nevertheless, 19 countries are classified as water stressed, and more of these are in Africa than in any other region (Watson 1997). Water stress is likely to increase regardless of climate change, due to increases in demand from agriculture, industry and domestic use, degradation of watersheds caused by land-use change, and siltation of river basins. As climate change exacerbates water stress, it reveals the importance of the underlying water management problems, and underlines the urgency of addressing them. This means that on the one hand, water problems can be solved by addressing social issues, but on the other hand, the challenges of water supply increase with climate change, and put even higher pressure on society for addressing the problems in fruitful ways.

Although the effects of warming of global temperatures on precipitation are difficult to predict, current observed trends and scientific knowledge leave little doubt that some areas already severely affected by drought will experience further reduction of rainfall and increased temperatures which will exacerbate drying (IPCC 2007). Changes to the timing of rainy seasons, making them more difficult to predict and more rainfall coming in intense episodes, means that it may become more difficult to make use of water resources in rain-fed agriculture, hydropower and water supply systems. In Nepal, rising temperatures have increased glacial retreat and glacial lake outburst floods, which reduce the availability of water and hydropower energy (OECD 2003).. Extreme events strain people's capacity to cope with subsequent events, exemplified by the recent flooding in parts of East Africa that arrived on the back of several dry years. Water scarcity, as well as flooding, tend to be associated with outbreaks of diarrhoea, malaria and other health problems both in rural and urban areas. Unclean water is already the world's second biggest killer of children (UNDP 2006).

The fact that women and young girls, especially among poor people, often have the main responsibility for collecting water for their families reinforces gender inequalities in employment and education (UNDP 2006). Droughts often disrupt piped water supply, and more frequent droughts due to climate change will increase the problem. However, lack of access to piped water in the first place affects many people both in the cities and in rural areas, who have to rely on other sources of water for consumption, feeding and watering animals and other economic activities. Local streams and rivers, ponds and shallow wells are common water sources in rural areas, while urban populations often have to buy water from traders, which often become more expensive or unreliable during drought. Rural water sources sometimes become more polluted or dry up completely, forcing people to trek long distances to access water (Eriksen 2005). Drought often only highlights a general marginalisation of drylands undermining local capacity to adapt, through a lack of government or aid investment in water infrastructure, lack of local incomes sufficient to drill private boreholes, as well as lack of local influence over development decisions. Inequality of access to water during drought also leads to vulnerability. Shallow wells may be privately owned by a few families, which means that other families have to pay or can only access wells after the owners have satisfied their needs. Economic liberalisation policies, such as privatisation of water resources or decreasing government expenses and services, have increased the cost and often made water inaccessible to poor people (Orindi and Murray

2005). While it is sometimes expected that increased drought will lead to conflicts over water resources, the opposite has also been observed at the local level, that is, drought leading to increased cooperation and trade over water resources (Eriksen et al. 2006b).

It has been suggested that famines are in fact created mainly by economic and political processes, rather than climate-induced harvest failure. When incomes from production decline and basic goods that people have to buy become more expensive, it only takes a very small meteorological event to trigger a crisis (Sen 1981). Famines are also often used politically, for example to buy political loyalties. Droughts are sometimes 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. Democratisation at the local level may increase local influence over water supply, as well as the accountability of governments in poverty eradication efforts. For the case of Kenya, Eriksen et al. (2006b) show that democratic election of water committees and other village committees, with representation of vulnerable groups, is critical to securing a stable water supply during drought.

In addition to democratisation and economic processes, the case of Kenya shows that access to new technologies is critical to local adaptive capacity in the context of water supply and drought as well as climate change. People have always adapted to climatic variability and drought. Local technologies such as digging of shallow wells in dry river beds form the backbone of strategies to survive. However, a lack of further development of dryland technology is a cause of vulnerability. Sub-surface dams in seasonal rivers and water harvesting are cheap technologies that have been implemented in dryland areas in order to make better use of irregular rainfall. Access to water is critical not only for domestic consumption and hygiene, but also for economic activities including cattle rearing, business, brick making or small scale irrigated vegetable production that people often rely on when the harvest fails (Eriksen et al 2006b; Osbahr and Viner 2006).



Figure 1: Flooding of road and farms after intense rain is likely to become an even more common feature under future climate change. Access to diverse plots at different altitude and distance from the river is important to current local adaptation to variable climate conditions.



Figure 2: Village water pipes for domestic supply are critical for securing a decent life under current climate variability, and even more so under future climate change and increased risk of droughts. In addition to satisfying domestic water needs during drought and freeing up household work time, equitable access to water for poor people is important to be able to engage in alternative non-farm economic activities such as small scale business and reduce their vulnerability to future climate change.



Figure 3: Shallow wells for domestic and livestock use are critical for survival of farming as well as nomadic pastoralist groups during drought. Drought time watering of livestock here provide opportunities for trade, suggesting that facilitating mobility and interaction between farming and nomadic pastoralist groups is critical to adapting to climate change.

Agriculture and income generating activities

Climate change is likely to be a particular challenge for the agricultural sector and other income generating activities for rural populations, due to increased variability, heat stress, flooding and drought caused by climate change (McCarthy et al. 2001; IPCC 2007). The changes will reduce yields in many locations, for example in tropical Asia, while improving them in others. But even if the net effects are uncertain, there is little doubt that many areas will be adversely affected (McCarthy et al. 2001). Productive assets and infrastructure may be damaged by extreme weather events and floods can cut people off from markets. Although the role of farming in rural livelihoods appears to be declining (Rigg 2005), agriculture is an important source of income for many poor people. It is thus predicted that climate change and climate variability can increase poverty levels particularly in tropical regions (Mathur et al. 2004). In Africa, estimates indicate that nearly 60-70% of the population is dependent on the agriculture sector for employment. According to the IPCC (McCarthy et al. 2001), the overall economic impact of climate change on the agriculture sector could be (on average) up to 10% of the gross domestic products of the 40 of the poorest and most food insecure countries of the world – mostly in Africa. People who try to make a living in marginal areas are likely to be severely affected (Mathur et al. 2004). Farming in Africa is highly dependent on rainfed agriculture, and increased droughts can seriously impact the availability of food (Watson 1997).

Focus is often placed on the need for adjustments in climate sensitive economic activities, and people may shift cultivation and herding practices, farming new crops and grazing in new areas. But actual adaptation is less straight forward than simple adjustments. For example, it has been observed that people often cannot make use of seasonal forecasts and climate information to make necessary adjustments to production due to a lack of capital and labour, access to required inputs, and insufficient training (O'Brien and Vogel 2003). The strategies that people have developed to manage such climate variability must be strengthened. This means that adjustments that are required are multi-sectoral rather than pertaining to just one economic sector or activity. Even in rural areas, people normally rely on a number of different activities for food and income in addition to, for example, agriculture. Common for most groups of poor people, either urban workers, unemployed slum dwellers, smallholders in agriculture, rural workers or pastoralists, are livelihoods based on multiple activities and diversification of sources of income and food (Chambers 1995, Hesselberg 1996, Ellis 1998). Poor people are also increasingly 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).

The challenges posed by climate risk to people's income generating activities are met by a range of different coping and adaptation strategies. This often involves increased multiactivity when households and individuals diversify into many activities in order to secure basic needs. Moreover, the need for coping and adaptation strategies often lead to reinforced need for access to common pool resources. The dependence and need for local, informal economic opportunities and remittances also increase. People report doing a number of tasks-for-cash to

survive, such as producing charcoal, fetching water, collecting and selling wild foods, fuel wood, seeds from trees, and construction poles, and participation on public workfare schemes. Multilocality and migration also characterise coping or climate adaptation, as people migrate to other rural or urban areas where casual labour is available.

Diversification is no guarantee of successful adaptation in terms of securing basic needs in the face of climate variability or change, however. It has been observed that when a main activity such as agriculture fails, households try to specialise to another activity that can take its place as primary income source. However, most people lack either the skills, labour or capital necessary for such specialisation and instead resort to a range of opportunistic activities, including poultry sale, collecting wild foods and doing small scale business such as selling cakes. Adaptive capacity is therefore undermined by a lack of access to alternative income sources that yield a viable income, due to exploitative marketing arrangements, ecosystem degradation, decline in formal employment, and increase in HIV/AIDS and other health problems that restrict household capital and labour availability. Much of the infrastructure needed to start alternative income generating strategies, including electricity, water, and transport, is lacking, and there is a need for developing marketing structures, as well as research, development and diffusion of value adding technologies. Facilitating multiple incomes and addressing the processes that weaken local adaptation mechanisms are critical to reducing vulnerability among poor people (as exemplified in the next section and in Table 2).

The pattern of diversification observed during the 2003 drought in two villages in Mozambique exemplifies that many diversification strategies become unviable as drought intensifies (Eriksen and Silva 2003). Although local trade had initially increased at the start of the drought, alternatives dwindled and the village economy more or less closed down. People resorted to sale of charcoal and other local products that involved engaging with outside and urban markets, but in relations that were highly exploitative. The poorer groups 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 trade and taking casual employment on commercial farms. These activities had marginal and decreasing returns with the increasing number of people engaging in them (Eriksen and Silva 2007).

When faced with severe and prolonged climatic events, some of the most vulnerable people have to sell key productive assets such as land, livestock, farm tools, roof of the house or even resort to prostitution, thereby endangering their livelihoods in the long term. In Bangladesh, during the floods in 1998, some of the affected households were able to use emergency food and change their employment away from agriculture. However, poorer households coped through reducing food consumption and through the sale of assets, reducing their resilience to future shocks. As a result of social or political restrictions, the poor may also be forced to remain in exposed areas (DFID 2004). Among vulnerable populations, many coping and crisis strategies become routine or permanent in such a situation.

Health

Health is a fundamental issue to the vulnerability of the poor since it is both an element of quality of life and prerequisite for securing other aspects of a decent life, including material needs and social rights. Climate change is expected to lead to increasing incidence and extent of some vector borne diseases, like malaria, schistosomiasis, and dengue-fever. These are very sensitive to climate conditions and are likely to spread into new regions. Furthermore, waterborne and water-related infectious diseases like cholera are also expected to increase due to higher temperatures and higher humidity, interacting with other factors as increases in population, urbanisation rates, water quality declines, and other factors (Watson 1997, Garcia-Herrera et al. 2005; Watson et al. 2005) Climate change may also exacerbate air pollution, currently already a serious health problem in many cities. Extreme weather events, which may increase under climate change, already represent a health threat because they lead to injuries, disabilities and deaths. Climate related loss of coastal resources, reduction in ecosystem productivity and decline in agricultural productivity can also have negative health impacts (ADB 2005). Heat stress can lead to mortality and inability to work, as observed during past severe events such as the 650 deaths that occurred in Orissa in northern India in 1998 (McMichael et al. 2003, Greenpeace 2007¹). Drought and floods, which are increasing due to climate change, often lead to poor water supply, unsanitary conditions and the spread of disease. The concentrations of sewage waste and industrial effluents, can increase when water level drops in dams and rivers (Watson 1997). Ill health due to all problems mentioned above have far-reaching economic consequences, through decreased productivity and economic growth, reinforced inequalities and poverty (UNDP 2006)

Many people commonly lack access to formal health care, partly due to the poor coverage of health facilities. People try to manage health problems by seeking casual labour or selling assets to cover increased cash needs for hospital bills, using indigenous medicinal plants, and increased reliance on social networks to cover costs. Poor health, for example due to the spread of HIV/AIDS increases vulnerability to climate change and was a major reason that the 2002 drought in southern Africa, which was not exceptional from a meteorological point of view, had such serious consequences. Due to the extra stress of HIV/AIDS and loss of household labour due to illness/death as well as need to care for the ill, traditional coping mechanisms in some families had to some extent broken down. There are now more children-headed households, who lack the skills and strength to cope with stress situations such as drought and floods. Indigenous knowledge regarding how to manage climatic variability is

¹ <http://www.greenpeace.org/india/campaigns/choose-positive-energy/what-is-climate-change/climate-change-its-possible>

lost as the parent generation dies. When the immune system is already compromised, prolonged hunger can have far more drastic consequences than when a person is in good health. The weakened health state of many poor people due to inadequate nutrition often leads to disease outbreaks during onset of rains after prolonged drought.

The case of malaria illustrates that the most important reasons for high vulnerability among many poor in terms of negative health effects from climate change are social rather than climatological in nature. Malaria can be eradicated through spraying and mosquito nets, and people can be cured through medicines regardless of any spread due to climate change, but poor households, and children in particular, often have no mosquito nets. In addition, poor are often unable to access or pay for adequate medical treatment during malaria epidemics. Malaria epidemics seriously affects adaptive capacity because many households sell their food crops to cover the cost of treatment, others borrow money or rely on remittances, while some resort to selling their land (Olago 2005). These coping mechanisms may lead to an increase in food shortages, debts and material poverty.

4. Winners and losers from climate change: Limits to adaptation and equity issues

Climate change has been framed as an equity issue because poor people contribute negligibly to the problem, but are vulnerable and will be most adversely affected by climate change. Adaptation is in itself also an issue of equity because some adaptation measures, whilst reducing the vulnerability to climate change of some people, may unintentionally increase the vulnerability of many others. For example, new coastal infrastructure could disturb the offshore sediment balance, resulting in erosion in nearby coastal areas. Constructing dams and irrigation infrastructure can benefit irrigation farmers and electricity consumers in cities, but is likely to increase the vulnerability of poor people evicted from farmland and resources that are critical to their own adaptive strategies.

Adaptation is a political process since the support of a particular type of adaptation measure can favour one social group or area over another. Adaptation efforts can also have negative effects in the long term. Irrigation, though enabling harvests in the short term, can lead to the salinisation of soil and the degradation of wetlands, as well as 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 seeking to understand the relevant social and environmental processes.

Negative effects of climate change will furthermore be felt because there are limits to adaptation. For example, there may be physical changes, such as in frequency of flooding or extent of inundation due to sea level rise, that are so large that sufficient adjustments cannot be made. Other people may be unable to adapt due to social and structural limitations. Although options for adaptation to climate change exist, it does not mean that every vulnerable community, sector or country can manage to adapt (Smit et al. 2000, Smith et al. 2003). Migration may be the only form of adaptation for many. The press has pointed out that

‘climate refugees’ in terms of tourists fleeing heat waves in southern Europe may seek cooler summers in Scandinavia. If this becomes the case, these are a privileged few who can pay for travel. The real climate refugees, however, are poor people who have to leave their farmland or homes due to floods, droughts or sea level rise, salt water intrusion and erosion, or fishers and pastoralists and other groups whose livelihoods become unviable.

Experience from Mozambique and Bangladesh shows that the large majorities of these refugees are, and are likely to continue to be, internally displaced people (Mallick et al. 2005; Lucio et al 2007). Developing countries already house millions of displaced people due to conflicts and natural disasters. Apart from a few who are housed in resettlement schemes, people who have left their home due to climatic stress normally end up in neighbouring villages or more marginal rural areas as landless destitutes with few productive assets or in urban informal settlements. Some migrate to neighbouring countries and are housed in refugee camps or work illegally in towns. Those who adapt to climate stress through migration therefore often end up with few economic and political rights, often losing their cultural and social affinity and security, as well as their sources of livelihoods, and may in turn become vulnerable to a wide range of stressors.

Climate change adaptation also has the potential to create “winners and losers”. Taking the Kenyan example described in Box 1, renting out wells to visiting groups of herders has become a new source of income for some people in Kitui, Kenya, while people who are not owners of wells find it increasingly difficult to access sufficient water and grazing for their cattle. But very few people can be considered ‘winners’ in the context of frequent armed violence and drought. Instead, there are gradations among those who are considered to be ‘losers’ (Sharp et al. 2003, Lind & Eriksen 2006).

It cannot be assumed that each and every adaptation measure automatically benefits the poor. Particular consideration should be given to how development action, unintentionally, may contribute to the creation of “losers” by worsening the vulnerability of certain individuals and groups in society. If, for example, new sources of livelihoods promoted by development agencies prove unreliable and people no longer have the traditional livelihoods to fall back on, the vulnerability to climate change may increase. Furthermore, biased power structures can be reinforced by some types of adaptation measures, thereby increasing vulnerability of the poor. Vulnerable people are by definition not in powerful positions. It is necessary to find out how pro-poor adaptation can be effectively implemented despite power structures biased against the poor.

5. What new measures are needed for poor people in order to adapt?

As explained above, individuals and households employ strategies to adapt to climate change. In addition, the challenges of poor people in the face of climate change necessitate climate adaptation measures from central and local governments, development agencies and NGOs. Such interventions can make several considerations. Addressing climate risk, strengthening adaptive capacity, and targeting the factors making people vulnerable, represent what has to

be done different in poverty eradication or development aid in order to strengthen adaptation to climate change among the poor. There is a potential for win-win solutions because climate change adaptation interventions can lead to improved ways of reducing poverty. The design and implementation of adaptation measures can also 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).

Successful climate change adaptation interventions relate to very diverse vulnerability contexts and existing strategies. We here highlight three practical ways that climate change adaptation can add to development and poverty eradication efforts. These are examples of measures that can both reduce risk, enhance local adaptation strategies, and address vulnerability factors. First, we will focus on the need for sufficient understanding of experiences and strategies of poor people and communities. Second we will suggest some potential measures of adaptation through improved management and innovative ways of utilising and maintaining local ecosystems. Third, we will attempt to illustrate the importance of removing structural and regulatory barriers to the adaptation strategies of poor people. Table 2 summarises some of the practical adaptation measures that may be useful in different local contexts.

In depth knowledge about local livelihoods is crucial for adaptation

The previous sections demonstrate that in order to identify how poor people can be supported in adaptation efforts, it is necessary to understand their livelihoods and strategies to cope and adapt to climate change and other challenges. Although it is commonly understood that the livelihoods of the poor should be considered in development planning, there is still often a lack of understanding of the ways that people respond to new and evolving threats nor of local ways of sustainable natural resource use. Without this understanding, development interventions may worsen an already difficult situation. 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). If based on sufficient interaction with affected populations and insights into their problems, strengths and potentials, however, interventions can improve local adaptation (Orindi and Murray 2005). Some of the coping measures developed by households and communities can only be of help in the short term and cannot deal with increased and more severe shocks. Nevertheless, it is becoming increasingly clear that many traditional strategies for coping with extreme climate events provide an important lesson for how society can better prepare and adapt to climate change in the long-term, and such strategies need to be strengthened.

In the case of dryland populations, it should be considered how existing development initiatives can better target those who are most vulnerable to climate stress. For example, current economic structures encourage the spreading of “modernized”, but often precarious, farming systems into increasingly arid environments, to the detriment of supposedly

“backward”, customary forms of pastoralism or forest uses. There is a need for incentives and structures to encourage the adoption of production systems that are adapted to climatic variations and change, such as pastoralism and investment in valuable trees in drylands. Creating and facilitating marketing outlets for processed forest products, provision of infrastructure including hospitals, schools, roads and decentralised watering points (through piping water into different areas) would lead to economic structures that are better adapted to climate change. In particular, such measures should be implemented simultaneously, in a coordinated way (Eriksen et al. 2006b). Such adaptation measures founded on in-depth knowledge about local knowledge systems and livelihoods, has the potential for sustainable reduction of vulnerability and increased capacity to adapt to new challenges. Adaptation strategies to climate change in all the three sectors of water supply, income generating activities as well as health, can potentially be strengthened and maintained through such an approach.

The urban centres in Africa, Asia and Latin America, where three quarters of the world’s urban population live, contain a large proportion of the people most at risk from storms, floods, sea level rise and other climate-related impacts. A third to half of the population in many cities in Africa, Asia and Latin America lack good provision of water and sanitation and live in informal and often illegal settlements. It needs to be considered how investments for adaptation to climate change can avoid undermining the housing and income generating strategies of poor people. By understanding the problems and needs of urban habitants living in very poor quality shelter (approximately 900 million people), it is possible to find strategies for reducing risk to climate change that also have the potential to reduce other risks. For example, relocation should be avoided wherever possible because it often leads to loss of income options. In stead, programmes can be implemented for upgrading current settlements wherever possible. Such upgrading involves the government working with the inhabitants of the informal settlement areas to find solutions for improving infrastructure, for instance for water, sanitation, drainage, and support for house improvements, combined with lowering flooding risks. Where low-income groups must be moved from hazardous sites, cooperation between the inhabitants and the government in deciding where to move and how to organise the move is important. Current policy making regarding informal settlements usually fail to take people’s experiences and strategies into account, as city governments tend to push inhabitants to peripheral areas, destroying their homes, asset base, social networks and their incomes (Satterthwaite 2006).

Adaptation through local and innovative ecosystem management

Climate change makes it even more important than before to stimulate a type of economic and social development that is adapted to climate change. One example is to manage, maintain and strengthen ecosystems in ways that enhance ecosystem services and improve access by the poor to these services. An ecosystem is a community of interacting organisms and the physical environment they live in; the forests, grasslands, wetlands, deserts, coral reefs, rivers, estuaries, and other living environments. They also include the farms, pastures, and rangelands – collectively known as agroecosystems. Ecosystem services are products obtained

from ecosystems, like food, fresh water, fuelwood, fiber, biochemicals, and genetic resources. They also provide benefits obtained from regulation of ecosystem processes, like improved local climate conditions, disease regulation, water supply and water purification. Approximately 1.6 billion people are currently dependent on forests in some way. The full potential of ecosystems as a wealth-creating asset for the poor has yet to be effectively tapped (World Resources Institute 2005). It is therefore crucial to strengthen people's opportunities for taking advantage of ecosystem services, both in traditional and new ways, in order to achieve economically, socially and climate resilient development. Such strategies can potentially reduce vulnerability and increase adaptive capacity in key sectors such as water supply, agriculture and income generation, and health.

Social organisation and community management of natural resources are shown to play an important role for promoting sustainable management of natural resources in poor communities (World Resources Institute 2005, Robledo and Forner 2005). It has also been pointed out that clarification of land tenure and land-use rights are key elements in promoting sustainable management, as well as facilitation from governments for improving access to markets for agricultural and other ecosystem products and providing relevant and timely market information. The state can also help by supporting small-scale processing plants to diversify and add value to natural products, such as by making timber into furniture, and by removing burdensome regulations and other barriers to the establishment of local enterprises based on ecosystem products (World Resources Institute 2005).

Efforts to take advantage of the untapped potential for wealth creation by use of ecosystems can involve the use of environmental technologies adapted to local needs and conditions, which can reduce vulnerability and increase adaptive capacity of poor communities and people. Such technologies consist of practices that combine local and introduced knowledge, such as agroforestry, organic farming techniques, like mulching, terracing, planting of cover crops, improved ways of using animal manure and intercropping (e.g. shade grown coffee). Water harvesting and decentralised energy supply are other technological solutions with a large untapped potential (Orindi and Murray 2005, Venema and Cisse 2004, Mathur et al. 2004). The sale of treadle powered water irrigation pumps in Kenya has surpassed 36,000, and is shown to substantially increase peri-urban and rural incomes, while 70% of the pumps are managed and controlled by women (Karekezi et al. 2005). Other measures are planting of valuable trees adapted to the climate and growing of oil-seeds, such as jatropha for biodiesel production, which can be grown for fencing and in areas not suited for agriculture. Another emerging opportunity is to facilitate selling of millet for bio-ethanol production in addition to food markets). Millet is a drought crop and where new markets give a better price, purchasing power of farmers also increases.

Renewable energy technologies, such as solar, biomass, wind and geothermal energy, which are treated in the next chapter of this report, are usually seen as climate change mitigation technologies, but are also highly relevant to sustainable economic and social development, including climate change adaptation. They make it possible to harvest rich natural resources like the sun, surplus biomass, wind, and geothermal energy. The diversity of new renewable

energy technologies makes it possible to choose energy sources which are resilient to changes in local climate conditions. An implication is that in order to promote adaptation that is sensitive to local livelihoods, the widespread focus on large hydro projects should be replaced by a broader approach that increases the technological diversity of the energy sector.

Box 2: Examples of local ecosystem management for enhanced adaptive capacity

Increased access to knowledge and experiences from other communities about sustainable practices for using ecosystems, such as through south-south transfer of experiences can enhance adaptive capacity. There is also an urgent need for governments to support such local measures to make ecosystems healthier and more resilient to climate variability and change (AfDB et al. 2003). An example of how improvements of ecosystems have reduced vulnerability is provided by the case of Machacos, Kenya. The area had extensive soil erosion in the 1930s, believed to be caused by overpopulation. 60 years later, with a population that had increased five-fold, erosion was substantially reduced, due to measures implemented by local inhabitants, including terracing, use of various grasses to stabilise embankments, tree planting, manuring and soil management techniques. The increased number of people had made it possible to intensify and improve agricultural production. In addition to the changes in agricultural techniques, access to markets due to the relatively close distance to Nairobi played an important role in these changes (Tiffen et al. 1994, Benjaminsen and Svarstad 1998). In areas in China where land is subject to severe land degradation, the government has recently undertaken integrated ecosystems management. Eco-farming integrates renewable energy use such as solar power, vineyard cultivation, and legume planting for fixing sand and providing forage. In Vietnam, mangrove planting led to improved resilience of the local population to climatic extremes and provided livelihood opportunities through harvesting of shellfish among the mangroves.

Removing barriers to people's adaptation strategies

People's responses in the face of shocks and longer term changes can be both facilitated and hindered by government policies and measures, as well as development projects. Many of the coping and adaptation strategies used by poor people are currently undermined by political, economic and legal structures. Such structures need to be targeted in efforts to reduce vulnerability. Economic structures that increase vulnerability include those creating increasing marginality of on- and off-farm livelihoods and natural resource based activities, growing local inequality, environmental degradation, spread of HIV/AIDS, conflict and insecurity, and decreasing employment opportunities.

Charcoal production, an increasingly widespread drought adaptation strategy many places in eastern and southern Africa, exemplifies how legal and economic structures limit the profitability of the activities for poor rural producers, increasing their vulnerability. Charcoal production has been blamed for dryland forest loss but is the main energy source for cooking for a growing urban population. In Kenya, wood fuel, particularly charcoal production and trade, is providing direct employment for around 200000 people and it is estimated that the total number of people involved in the charcoal trade during the year (including traders and vendors) is over 500000, supporting two million dependents. The contribution from charcoal to the Kenyan economy is comparable to the annual returns from tea exports (2002) (ESDA 2005). Contrary to popular belief, most of the charcoal produced in Kenya is sourced from individual farms and private land, mostly ranches. It is illegal to produce and transport

charcoal in Kenya, but legal to sell, buy and consume in towns and cities. The banning of charcoal production is based on the assumption that charcoal is sourced from government land, leading to deforestation, while this accounts for less than a tenth of the total trees sourced for charcoal. This banning is a central barrier to charcoal production as a viable adaptation strategy as it channels the largest profits to traders and the authorities, discourages investment in the trade and encourages unsustainable practices of tree-felling without tree-planting as well as inefficient ways of producing the coal. In order to achieve a sustainable use of this potentially renewable energy resource, and improve the opportunities of income-generation for the poor, legal and economic structures of the sector must be changed (ESDA 2005, Bailis et al. 2006).

In the longer term, if a transition to other cooking fuels is promoted, there are many opportunities for simultaneous transitions to other and modern uses of biomass resources, which have the potential for other income generation activities (ESMAP 2005). Biomass (included charcoal) is an indigenous, potentially sustainable renewable natural resource, but it must be managed and harvested effectively.

Table 2. Summary of practical examples of how climate change adaptation can add to development and poverty eradication efforts

Challenges weakening poor people's adaptation strategies	Measures that may contribute to both adaptation and poverty reduction
<p>1) Development interventions inadequately taking account of poor peoples' livelihoods and adaptation strategies</p> <ul style="list-style-type: none"> • Imposition of external technologies, such as large scale water dams, spreading of 'modernized' farming systems and seeds and exotic tree species into arid environments • Underutilisation of knowledge accumulated from adaptation to local climate conditions • Little research infrastructure and support for adapted production systems such as nomadic pastoralism and indigenous tree products • Isolated and large-scale infrastructure provision projects such as irrigation neglecting other pressing needs, especially those of the poor • Forced relocation of people in informal city settlements, pushing poor city dwellers to peripheral areas away from livelihood options 	<p>Measures to strengthen poor people's livelihood and adaptation strategies</p> <ul style="list-style-type: none"> • Support and develop local technologies, including shallow wells, sub-surface dams, water harvesting techniques, local seed varieties and planting of indigenous tree species. Support marketing of local products • Document past and present adaptation strategies and supplement them with relevant strategies and technologies, support local knowledge systems • Facilitate improvements of production systems adapted to normal climate stress, like pastoralism and indigenous tree products, through strengthening marketing infrastructure, veterinary services, research and development, processing and value adding. • Evaluate how infrastructure provision may affect the climate change vulnerability of the poor, ensure poor people's needs, for example water access for adaptation strategies • Improve drainage systems and flooding protection in low-income areas, avoid relocation if possible and ensure continued access to livelihoods. Cooperate with the inhabitants on infrastructure and house improvements or if necessary, on relocation.

<p>2) Consequences of degraded ecosystems for vulnerability</p> <ul style="list-style-type: none"> • Lost potential for the use of ecosystem products and services for economic and social development • Lack of innovative use of ecosystem services and neglect of the importance of forest products in adapting to climate variability and change • Lack of access to existing and relevant knowledge and technologies, one-sided focus on conventional, centralised energy supply 	<p>Climate change adaptation through improved and innovative management and use of local ecosystems</p> <ul style="list-style-type: none"> • Maintain and strengthen ecosystems, improve access for poor people. Emphasise community management and access to protected areas and counteract privatisation and large scale commercial exploitation of crucial adaptation resources, such as water or forest. • Strengthen people's opportunities for both traditional and new ways of taking advantage of ecosystem services. Clarify land tenure and land use rights. Promote raw materials like Jatropha and other hardy biofuel crops and local collection and processing. • Facilitate the use of environmental technologies, including agroforestry, organic farming techniques like mulching and planting of cover crops, harvest local resources like solar power, surplus biomass, wind and geothermal energy
<p>3) Barriers hindering poor people's adaptation strategies</p> <ul style="list-style-type: none"> • Lack of attention to the income sources of poor people • Income generating activities during drought such as charcoal limited by the ambiguous legal framework, which siphons profits away from the poor producers, discourages investment and encourages unsustainable practices • Discourses labelling adaptation strategies of the poor as unsustainable or primitive • Little value adding to natural products and poor market position of products. Lack of infrastructure for transportation and information exchange adapted to the needs of the poor • Marginalisation of nomadic pastoralism and barriers to migration • Poor health limiting household labour and engaging in adaptation strategies • Conflicts and insecurity leading to loss of lives and productive assets and making access to key resources for adaptation, such as drought grazing, unsafe 	<p>Measures for removing structural and regulatory barriers</p> <ul style="list-style-type: none"> • Provide facts about the economic importance of income generating activities performed by the poor. Facilitate south-south transfer of experiences • Change the poor legal structures of the sector, promote efficient kilns for charcoal burning, promote sustainable practices of wood harvesting and growing. • Uncover myths and exaggerations, identify underlying reasons for unsustainable practices, invest in research and development of livelihood and adaptation strategies based on local resources • Support small-scale processing plants products. Improve transport facilities (trains, buses, roads planned for cycles, carts and pedestrians) and other factors to access markets, provide relevant and timely market information. • Ensuring access to drought grazing areas, facilitating migration and seasonal trade through providing security and infrastructure (like water points, markets, roads, and health and veterinary services) • Measures to reduce the incidence of malaria among poor, enhanced health systems, make treatment for HIV/AIDS available to poor • Strengthen police posts and security in marginal areas, enhance conflict resolution and civil society such as peace committees

6. What should Norwegian agencies do in order to reduce the vulnerability of the poor?

This chapter has highlighted particular challenges and sources of vulnerability for poor populations in the face of climate variability and change, and presented emerging insights into ways that potential adaptation efforts can be designed and supported by government and development agency efforts. These provide a point of departure for discussing and developing ways of integrating climate change adaptation in the development work of Norwegian agencies.

One of the key challenges for Norwegian development agencies in integrating climate change adaptation in development efforts is approaching climate change adaptation as a development issue. First, adaptation requires very different measures from emission reduction efforts, and needs to be treated as an independent issue, rather than as an add-on, to emission mitigation. Second, adaptation efforts need to be comprehensive, focusing on enhancing adaptive capacity and reducing the societal factors causing vulnerability in addition to reducing climate risk itself (Eriksen et al. 2007). We have suggested that such changes specifically require understanding of the livelihoods and strategies to cope and adapt to climate change and other challenges; identification of innovative ecosystem management options; and removing barriers to local adaptation strategies. This means that understanding of adaptation to climate change needs to be enhanced among governmental and non-governmental agencies involved in development aid in Norway, as well as in the country offices in developing countries. Since climate change adaptation affects all sectors of development, the issue cannot be delegated to an isolated sector or part of the organisation while it is ignored by the rest. Making good use of the poverty and development expertise that exist in these organisations is crucial in developing procedures for integrating climate change adaptation into development work. Climate change vulnerability concerns must be integrated into individual projects, and rather than applying “one-size-fits-all” solutions, it is necessary to evaluate what local factors create vulnerability in each context.

Given the need to learn from emerging experiences, collaboration internationally between development agencies can enhance efforts to integration of climate change concerns. Norwegian agencies can also play a role in lifting adaptation issues higher on the agenda of international meetings and negotiation processes. Climate change and climate change adaptation in particular is not always high on developing countries’ agenda as here, too, climate has often been framed as an emissions and environmental issue only, and vulnerability of poor people is not well understood. Norwegian organisations can contribute to capacity building through research and south-south exchange of experiences and scholarships can fund students of the affected countries for higher educational level studies on the issue of climate change. Collaboration with development country research and civil society is likely to build capacity for both.

Equally if not more important is the role that Norwegian agencies can play in bringing climate change adaptation into dialogues with recipient countries, for example in Poverty Reduction

Strategy Papers and other development policy processes. The countries can be supported in their work for strengthening political leadership and enacting legislation related to climate change, vulnerability reduction and building of adaptive capacity among the poor. Norwegian agencies can also assist countries in increasing the budget for adaptation measures. Essentially, a type of poverty reduction planning less premised on economic growth, and more premised on reducing vulnerability of the poor needs to be promoted. It is necessary to challenge some political and economic structures as well as developments currently exacerbating vulnerability.

7. Conclusion

The climate challenge highlights societal problems that are currently insufficiently addressed - the social and environmental conditions that make people vulnerable to a changing climate. To put it simply, fundamental societal changes are required to adapt in a way that makes the poor more able to secure a decent life in the face of climate change. Therefore, governments and development organisations also need to refocus their activities as a response to the climate challenge.

Increasing efforts for understanding and strengthening existing livelihood adaptation strategies related to climate challenges is an important first step to this end. This is a strategy that makes a broad integration of climate change into the development agenda possible and also helps identify the vulnerability context that needs to be addressed, such as HIV/AIDS, disempowerment processes, or conflicts. It is a strategy that has the potential of reducing vulnerability of the poor, eradicate poverty and strengthen the capacity of poor people to handle multiple challenges. Such an approach also helps highlight potential conflicting interests and winners and losers from different types of adaptation interventions. Furthermore, interventions can focus on enhancing poor people's access to natural resources, promotion of community management practices of ecosystems, facilitation of income generating activities through innovative use of ecosystem services and improved access to markets, as well as facilitating access to environmental technologies and south-south transfer of experiences, technologies and practices adapted to local needs and natural resources. Finally, the barriers to local adaptation strategies can be addressed. Adaptation interventions and poverty reduction measures that do not take the above concerns into account run the risk of unintentionally increasing the vulnerability of some people and groups, especially the poor.

The practical examples of adaptation measures presented in this chapter show that a diversity of adaptation efforts are needed because of the range of challenges from climate change and the diversity of local contexts and existing strategies. Some of the measures outlined in Table 2, such as enhanced access to water and health infrastructure, are in line with what is already considered 'good practice' in development interventions and underwrite the need to ensure that such good practice is implemented in practice. Other measures such as enhanced common property management rather than privatisation of resources challenge current development and liberalisation discourses. Importantly, some measures, including enhancing use and

processing of local plant products are seldom prioritised in current development measures. Reducing the vulnerability of poor people involves refocusing measures towards strengthening climate-adapted strategies and technologies. Imposition of large scale measures and external technologies are likely to both marginalise local technologies and incomes further, make livelihoods more sensitive to climate variability and change, and potentially increase the vulnerability of many poor people. This latter observation represents one of the key challenges to Norwegian agencies in the context of supporting adaptation in developing countries: the needs of the poor are often least heard, and often involve measures that may be perceived by some national authorities to attract less prestige, western technology and capital. Identifying the actual needs and interests of different poor groups in relation to climate change, and promoting these in the planning and implementation of development measures is therefore important in reducing vulnerability to climate change. Addressing the social factors that make any particular poor group vulnerable to climate change, be they privatisation of natural resources, declining health, and conflicts and insecurity, may well involve challenging existing political and economic structures.

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