OXFAM RESEARCH REPORT

Climate Change Adaptation

Enabling people living in poverty to adapt

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Climate change is fast pushing the poorest and most marginalized communities beyond their capacity to respond. This report draws on case studies from around the world and on Oxfam's experience working with rural communities. It sets out what is needed to enable people living in poverty to adapt to climate change, and a range of interventions that are available. Oxfam's approach brings together experience in the areas of livelihoods, natural resource management, and Disaster Risk Reduction, with robust decision making in order to manage uncertainty and risk, and to build adaptive capacity from household to national and global levels. The report identifies the combined need for bottom-up and top-down processes in order to create the enabling conditions needed for people living in poverty to adapt to climate change.

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Contents

Executive summary

Climate change is fast pushing communities, particularly the most poor and marginalized, beyond their capacity to respond. Across the world, staple subsistence crops are approaching their outer viable temperature ranges; erratic rainfall patterns and changing seasons are upsetting agricultural cycles and leaving many struggling to feed their families; and rising sea levels are causing the inundation of crops and the contamination of water supplies with salt water.

This report draws on case studies from around the world and Oxfam's experience working with rural communities to set out what is needed, and a range of interventions that are available, to enable people living in poverty to adapt to climate change. Nonetheless, there are limits to adaptation, and without rapid and significant global mitigation, these options will be quickly lost.

Who is vulnerable to climate change and why?

Poverty, more than any other factor, determines vulnerability to climate change and limits adaptive capacity. Access to and control over land, money, credit, information, health care, personal mobility, and education combine to determine the ability to survive and recover from disasters and to make long-term changes and investments to adapt. Existing gender inequalities combine with poverty to magnify women's vulnerability to climate change and undermine their ability to adapt.

Adapting to what?

Warming of the climate system is unequivocal; however at the local level the information required to make conventional planning decisions is lacking at the level of certainty required by those who need it. This demands an approach to adaptation that manages uncertainty and fosters adaptive capacity. Adaptation is therefore not a choice between reducing general vulnerability or preparing for specific hazards, such as floods; adaptation requires both, in an ongoing change process whereby people can make informed decisions about their lives and livelihoods in a changing climate. *Learning* to adapt is as important as any specific adaptation intervention.

An approach to adaptation that works, even with uncertainty, combines activities that:

- address current hazards, increased variability, and emerging trends;
- manage risk and uncertainty; and
- build adaptive capacity.

What processes work for those most vulnerable?

The human security framework and Hyogo Framework for Action show that to empower communities to manage risk and uncertainty requires both bottom-up and top-down processes. Making a change at the local level requires community-based action supported by high-level political will and devolved resources and decision making.

Oxfam and Earth Net Foundation's adaptation project in Yasothorn Province, Thailand with organic rice farmers (see Box 4) highlights the combined role of bottom-up and top-down activities. Firstly, individuals and communities developed effective solutions themselves. Second, access to information was key; while the farmers were well aware that the weather was changing, they needed external input about climate change to be able to make informed decisions about their future activities. Thirdly, these solutions could only be implemented in an enabling environment, which, in this case, involved NGO grants and technical support.

Climate change impacts, vulnerability, adaptive capacity, and barriers to adaptation are location-specific and will change over time, but the *processes* needed for adaptation that supports the most vulnerable will be similar. National adaptive capacity is one part of that puzzle. Community design and implementation of adaptation strategies suited to their location is another. A crucial element of both is the role of local level government and services. They must be empowered and resourced to act as intermediaries, linking the bottom-up and top-down processes.

Building solutions for climate change adaptation in rural livelihoods

Sustainable livelihoods in a changing climate: Populations dependent on agriculture are particularly vulnerable to climate change through the climate-sensitive nature of their activities and their economic and political marginalization, often compounded further for women due to gender inequality and the impacts of male out-migration in response to climate shocks and failing harvests. Communities need to have access to forecasts and appropriate technologies; wise management practices should be used and supported; and the existing conditions that limit adaptive capacity should be addressed. For example, in the project in Yasothorn Province, Thailand, key to the success were educating farmers about the impacts of climate change and linking them to sources of weather and climate information; the development of appropriate farm water-management systems; engagement with other communities to share experience and to advocate for change; and the opportunity to study the impacts of climate change on women.

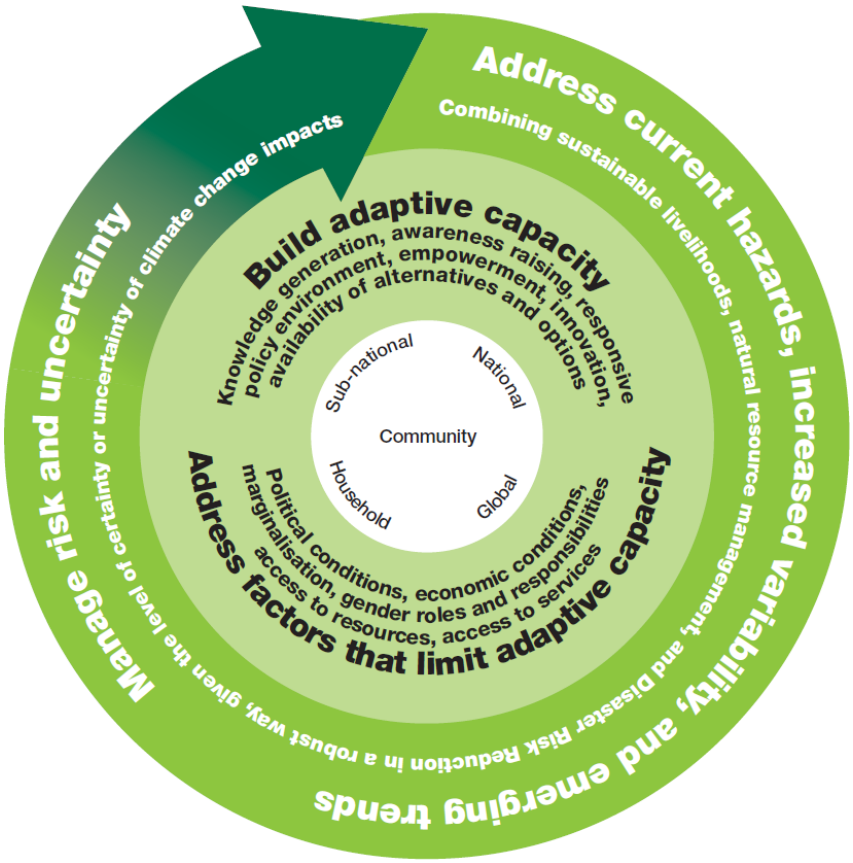
Strengthening natural resources: Climate change demands the wise management of natural resources, firstly, because climate change increases resource scarcity. For example, in areas that are becoming drier and in coastal areas suffering from saline intrusion, there is a reduction in the availability of water for household and productive use. Second, the role that natural resources play in buffering communities against extremes of climate becomes more important as climates become more adverse. For example, increasing the soil's organic content improves water retention and drainage, which can help crops where rain becomes more concentrated into heavy downpours. Reforestation can reduce local temperatures; provides additional income; protects against soil erosion, landslides, and local flooding; and provides food and fodder in times of scarcity. In Maharashtra State, India, the Watershed Organisation Trust is assisting poor, rural communities with watershed restoration projects to combat the degrading effects of recurrent droughts and human pressures on the surrounding land. Measures undertaken include soil, land, and water management, such as trench building to control erosion, improve soil fertility, and enhance groundwater recharge; afforestation and rural energy management,

such as by banning tree-felling and promoting the planting of shrubs and grass to meet household fuel needs; and livestock management and pasture development. Alongside these interventions, measures to increase adaptive capacity include micro-lending, training in new techniques, and the formation of community groups seeking to diversify livelihoods (see Box 10).

Reducing the risk of climate-related disasters: Climate-related disasters have increased in frequency and/or intensity as a result of climate change. The trend is already noticeable, with a dramatic and continuing rise in the number of small- and medium-scale climate-related disasters; since the 1980s, the average number of people reported as affected by climate-related disasters has doubled from 121 to 243 million a year. As a result, Disaster Risk Reduction (DRR) needs to incorporate climate change analysis, and is an important component of adapting to climate change.

Decades of development theory and practice prove that a holistic, people-centred approach is the best path to effective and sustained poverty reduction. The challenges presented by climate change mean that it is also the only way to adapt. To go beyond resilience, which deteriorates as conditions change, to transformational changes in the lives of people living in poverty in a changing climate demands enormous political will and investment. It demands flexibility and learning through every institution, from household to government. It demands an approach that combines bottom-up with top-down processes; local knowledge and scientific knowledge; reducing vulnerability and addressing impacts; specific responses and managing uncertainty; sustainable livelihoods, natural resource management and DRR approaches; change, and learning how to change. Climate change forces us to draw the strands together, not only to lift people out of poverty, but also to enable them to manage risk and uncertainty as well as shape, create, and respond to changes throughout their lives.

Figure 1: Oxfam's approach to climate change adaptation



1. Communities are at the centre of Oxfam's approach to Climate Change Adaptation; however, enabling them to adapt requires working across multiple levels from household through to global.

2. In order to build adaptive capacity, factors that limit adaptive capacity across all levels must be addressed alongside actions that actively build capacity to adapt to climate change.

3. Interventions are required that span the range of what is known and unknown about climate change in a specific location. This range starts with addressing the current hazards, increased variability, and emerging trends, and extends through to managing risk and uncertainty of impacts where the direction and scale are uncertain.

Glossary of key terms

Adaptive capacity: The potential of individuals, communities, and societies to be actively involved in the processes of change, in order to minimise negative impacts and maximise any benefits from changes in the climate.

Climate change: A change in climate that persists for decades or longer, arising from human activity that alters the composition of the atmosphere (i.e., greenhouse gas emissions).

Climate change adaptation: Actions that people and institutions make in anticipation of, or in response to, a changing climate. This includes changes to the things they do, and/or the way they do them.

Climate resilience: Where adaptive capacity relates to the ability to influence and respond directly to processes of change (to shape, create or respond to change), resilience is the ability to absorb shocks or ride out changes.

Climate variability: Natural variations in the climate that are not caused by greenhouse gas emissions (e.g., it rains more in some years and less in others).

Disaster risk reduction (DRR): The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.[1]

Mitigation: Measures to reduce greenhouse gas emissions (note that the term 'mitigation' is used differently by DRR practitioners, who use it to mean reducing or limiting the adverse impact of hazards and related disasters).

Vulnerability: The characteristics and circumstances of a community, system, or asset that make it susceptible to the damaging effects of climate change and other hazards.

1 Who is vulnerable to climate change and why?

Box 1: A 'model farmer' in Uganda

At the foot of the fabled 'Mountains of the Moon' in Rwenzori, Uganda, lies the small town of Kasese. With the mountain obscured from view high in the clouds, the most striking feature of the landscape is the bareness of the foothills. Hills that were once flourishing forests are now barren, or a tapestry of fields, or, more arrestingly, deep brown gouges cut into the earth. This landscape is a result of poverty: with little access to productive land, people have been forced to clear steep slopes in order to grow some crops and, with no access to other fuels, have stripped the hills of firewood.

Dorothy Musoke, a subsistence farmer, told Oxfam, 'The seasons keep changing; the rains don't come when I expect them so then we have drought and it is so hard to grow anything. My maize is just about coping, but my beans won't grow.' She used to rely on the constant rain during the rainy seasons to grow her crops, now they don't come and her plants fail. When the rains do come, they come so heavily that the parched soil cannot absorb the inundation, and soil and crops get washed down the slope. Even when crops failed again and again, she felt she had no other option than to continue with them and hope that things improved. But they did not. In fact the incidence of flash floods and periods of drought increased, and so she, like many others in her community, ended up relying on short-term 'coping' strategies, including taking out loans, food aid, or eating less. These short-term fixes do not offer a long-term solution; indeed, they undermine well-being and deplete assets that aid recovery.

Dorothy is now a 'Model Farmer' in the Foundation for Urban and Rural Advancement (FURA) livelihood programme, supported by Oxfam. The programme is helping communities in the area to adapt to the changing rainfall patterns that they are experiencing. They provide training and advice on agricultural techniques and have set up a community nursery to grow seedlings, which can be used to replace crops lost to floods and drought, as well as to try new crops, such as those more suited to the changing conditions.

Dorothy has tried to protect her field from flash floods by digging a trench at the top of the slope to break the flow of water. However, despite the trench, a recent flood washed some of her crops and soil away. Dorothy wants to dig more trenches at intervals down the slope or plant rows of vetiver grass. Without the support from FURA, she would be unable to purchase the wheelbarrow and spade she needs to do this work. She also wants to be able to collect some of the water when it falls so heavily, because the rest of the time there is little rain, so if she could collect it and could buy a watering can, it would help her.

Is Dorothy positive about the future? She says she has some hope while some crops, particularly low groundcover crops, are still just about viable. She is also positive about the help offered by FURA – she has visited another district to learn about various agricultural techniques, including those to slow down flood waters; and also to learn about alternative crops she might be able to grow – she has also received seedlings from the programme. As a Model Farmer, Dorothy has been trained so that she can share her experiences and knowledge more widely, and she says that she feels it has made a real difference in the community.

Source: Author interview, May 2009

Climate change is a global problem and affects everyone, but it does not affect everyone equally. Geographic location is of course a key factor; some areas are simply more affected than others through their physical characteristics and the interaction between local climate systems.[2] The Intergovernmental Panel on Climate Change (IPCC) report that 'eleven of the last twelve years (1995–2006) rank among the twelve warmest years in the instrumental record of global surface temperature (since 1850).'[3] Warming is most pronounced in higher northern latitudes, and land areas have warmed faster than oceans.[4] There is evidence that the significant increases in precipitation observed in eastern parts of North and South America, northern Europe and northern and central Asia, and the declines in the Sahel, the Mediterranean, southern Africa and parts of southern Asia over the last century have been exacerbated by anthropogenic climate change.[5] Anthropogenic climate change is more likely than not responsible for the increase in areas affected by drought in the last 40 years.[6] These trends are likely to continue, and it is very likely that hot extremes, heat waves, and heavy precipitation events will become more frequent.[7]

Low-lying coastal plains, islands, and deltas are especially exposed to coastal erosion and land loss; inundation and flooding; and contamination of freshwater sources with seawater. Populations are particularly at risk in the small islands states of the tropics with maximum elevations of just three or four metres above present sea level, such as the Bahamas, Kiribati, the Maldives, and the Marshall Islands; in the large delta regions of Bangladesh, Myanmar, Viet Nam, and Thailand; and in the low-lying areas of Indonesia, the Philippines, and Malaysia.

But geographic location is not the only or even the most influential factor of climate risk.[8] Institutions matter much more. How severely these changes are felt depends upon how vulnerable a population is to these impacts and their ability to respond. Vulnerability describes the reduced ability of some communities to cope with climate change impacts caused by a variety of factors, such as inequalities in resources, capabilities, and opportunities that disadvantage certain groups of people and reduce their ability to cope with and recover from a shock or change.[9] Countries that are economically reliant on such climate-sensitive sectors as agriculture and fisheries are particularly vulnerable to any changes in climate conditions. Countries with limited human, institutional, and financial capacity to plan and respond to the direct and indirect impacts of climate change are also particularly vulnerable.[10] Vulnerability encompasses those characteristics and circumstances of a community, system, or asset that makes it susceptible to the damaging effects of climate change and other hazards.[11] By contrast, adaptive capacity is the potential of individuals, communities, and societies to be actively involved in the processes of change, in order to minimise negative impacts and maximise any benefits from changes in the climate. This *potential* is undermined in situations of poverty and inequality, and points to the wider socio-economic factors that influence how households and communities manage risk on a daily basis, and relates to the successes and failures of development and poverty reduction.[12]

Poverty, more than any other factor, determines vulnerability to climate change and limits adaptive capacity. First, people living in poverty tend to rely on climate-sensitive resources as the basis of their livelihoods. As highlighted by the Millennium Ecosystem Assessment (2005), 'Most of the world's 2.7 billion poor people depend on natural resources (water, forests, seas, soil, biodiversity, and so on) for survival and economic development; but the environment and the world's natural resources are already being substantially degraded and increasingly being affected by changes in the climate.'[13] Secondly, poverty means people have few assets to fall back on in times of increased hardship, including little or no savings, and generally limited access to credit. Poverty can lock people into livelihoods even when these are no longer effective by limiting access to information or opportunities to develop new skills; limiting access to methods

of spreading risk, such as insurance; or through a lack of opportunity in terms of making the investments needed to improve output or maintain viability. This means that change (whether driven by opportunity or necessity) is itself a risk. The remaining options tend to be unsustainable short-term coping strategies that can erode assets, or maintain the same inputs to achieve only dwindling outputs. Finally, people living in poverty are often forced to occupy the least productive or most disaster-prone lands, such as flood plains, slums, eroding hillsides, and low lying and unprotected coastal areas. Under these already difficult conditions, even modest changes of climate hazards will quickly push households and communities beyond their abilities to cope.

Climate change affects women and men differently. In many societies, men and women have distinct roles, responsibilities and status, giving rise to differences in vulnerability and adaptive capacity. Women are often particularly disadvantaged through unequal access to resources and opportunities.[14] Women are affected through their multiple roles as food producers and providers, as guardians of health and as care givers, and as economic actors. Women are more likely to become direct victims (mortalities and injuries) of climate-related disasters, such as hurricanes and floods, as a result of cultural norms that mean they have not learned to swim; they are more likely to be at home when disasters occur; they try to protect their children before themselves; they are less likely to receive critical information for emergency preparedness and warning information usually transmitted in public spheres; or they are unable to leave their house without a male relative to escort them.[15] In the 1991 cyclone and flood in Bangladesh, the death rate was almost five times higher for women compared with men.[16]

Drought, deforestation, and erratic rainfall force women, who are often already marginalized and dependent on local natural resources, to work harder in order to meet household needs for food, water, and fuel. Consequently, they have less time to earn an income, receive an education or training, or to participate in decision-making processes. In many areas, climate change creates resource shortages and unreliable job markets that lead to the increased migration of men, leaving women alone with additional agricultural and households duties. Traditional roles are therefore reinforced, the ability of women to diversify their livelihoods or to access income-generating jobs is diminished, and girls are often taken out of school to deal with the increased burden.[17] Women's high level of vulnerability is itself a significant factor in the overall vulnerability of communities, given that women produce more than 50 per cent of the food grown worldwide and considerably more in many developing countries (for example in sub-Saharan Africa women contribute 60 to 80 percent of the labour in both food production for household consumption and for sale), in addition to their significant roles as carers of children, the elderly and the sick.[18]

Climate change exacerbates existing problems, including global food prices, insecure land tenure, inequality and marginalization, gender disparity, lack of access to financing, lack of access to modern energy supplies, soil degradation, competing demands for water resources, and deforestation; and compounds them with glacier melt, sea-level rise, increased frequency and/or severity of storms, droughts and floods, increased temperatures, and the spread of diseases into areas previously not exposed. Climate change adaptation must therefore reduce vulnerability both by reducing exposure to climate risk *and* through addressing existing and emerging inequalities of power and assets that would otherwise make adaptation impossible.[19] Successful adaptation means people becoming increasingly able to make informed decisions about their lives and livelihoods in a changing climate.

Box 2: Saline intrusion in south-western and coastal regions of Bangladesh – who are the most affected?

Saline intrusion has become a major problem for people in south-western Bangladesh, particularly Satkhira, Khulna, and Bagerhat Districts, and in the coastal reaches of Borguna, Pirojpur, Barisal, Bhola, Laxmipur, Noakhali, Chittagong, and Cox's Bazar Districts. During the dry season, households often lack access to safe drinking water. In Tala and Shaymnagar Upazilas of Satkhira District, two focus group discussions were established to understand women's perception of salinity-related problems and climate change vulnerability. Female participants identified a large number of problems, including:

- increased contamination of drinking water sources with saline water;
- unpredictable rainfall;
- low rainfall;
- increased temperature;
- increased drought conditions;
- delayed onset of winter;
- warmer and shorter cold spells;
- reduced availability of freshwater;
- excessive silting of canals and riverbeds;
- increased water logging; and
- change in the seasonality of monsoon winds.

The problems they characterised as most severe and in need of urgent attention were: increased contamination of drinking water sources with saline water, water logging, and drought conditions.

Women in south-western Bangladesh are generally responsible for collecting drinking water to meet household needs, irrespective of their physical condition. As a result of the increased salinity of all local water sources, women and adolescent girls report having to walk long distances, often three or four hours every day, in search of drinking water. Recent studies report that a significant proportion of women walking these long distances are pregnant or have recently given birth. While filtered water is available, the majority of households cannot afford to buy it, unless a family is unable to collect drinking water owing to sickness, in which case they have no option but to buy it at prohibitive prices, or to drink saline water.[20] The role of water collection is so vital that some elderly parents are unable to afford to have their daughters marry and leave the family home.

The significant time and energy it takes to collect water in saline-prone regions has an impact on other activities that women and girls undertake, including such household duties as cooking, bathing, washing clothes, taking care of elders, as well as education, training, and community or decision-making activities. This affects health and well-being both directly and indirectly, with reports of physical assaults by dissatisfied husbands when household duties are not met, and of harassment and physical risk when women and girls collect water from distant sources. Even when drinking water can be collected, the contaminated water is still used for washing and household purposes. Women and adolescent girls report suffering gynaecological and skin problems due to washing with contaminated water; clothes become stiff and coarse from the high salt content of the washing water and cause discomfort, rashes, bleeding, and infection.

Source: Based on A.U. Ahmed *et al.* (2009) 'Climate Change, Gender and Vulnerable Groups in Bangladesh', Dhaka, pp. 37–9.

2 Adaptation: action, and inaction, so far

In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted as the basis for a global response to climate change.[21] The primary objective of the Convention was to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human interference with the climate system. While adaptation has always been a vital component of the Convention,[22] progress has been relatively slow.

In 2001, at COP 7 in Morocco, a decision was made to provide financial and technical assistance to Least Developed Countries (LDCs) in order to help them to identify priority activities that respond to their 'urgent and immediate' adaptation needs; those for which further delay would increase vulnerability and/or costs. To date, 44 National Adaptation Programmes of Action (NAPAs) have been registered with the UNFCCC,[23] developed with support from the LDC Fund. However, few NAPA projects have been financed and implemented. This process is therefore failing to meet the stated objectives of addressing urgent and immediate needs, and countries urgently need finance for implementation.

For governments in developing countries struggling with multiple problems, climate change comes as an added and largely poorly understood complication. Climate change is often viewed as an environmental issue that is peripheral and sometimes in competition with the goals of development. Despite the crippling economic and social implications of climate change, many countries continue to be represented by environment or meteorological departments at international negotiations, which hold limited power at the national level. In many countries, development and finance ministries are still not entirely engaged, or even convinced that they need to be engaged. Yet development budgets are being overstretched by numerous national crises in which climate change is playing a role. Pamela Komujuni from the Department of Disaster Management, Relief and Refugees in Uganda reports: 'We used to plan on needing to deliver food relief two years out of every five, now it's every year. We also need early warning so that we can advise farmers when and what to plant. This will have an effect on our budget.'[24]

NAPAs were conceived of as a quick first step towards adaptation, but progress has stalled at this first step. Few actions have been taken to meet urgent and immediate needs, and fewer still to tackle the wide range of adaptation demands that countries face. Comprehensive and integrated national adaptation is the goal, based on the IPCC findings that 'adaptation is shown to be successful and sustainable when linked to effective governance systems, civil and political rights and literacy'.[25] Some countries have set up units or institutions responsible for adaptation planning and coordination across ministries and processes to ensure alignment with development priorities. The Climate Change Unit in the Uganda Ministry of Water and Environment is a small unit of experts that provides training, information, and advice on climate change and the implications for all sectoral planning (see Box 3), and the Government of Bangladesh has established a Multi-Donor Trust Fund to co-ordinate all financing and action on climate change nationally.

Estimates of the cost of adaptation in developing countries point to a scale of finance of the order of $50bn to $150bn a year. The financing goal set out in the Copenhagen Accord following COP 15 in December 2009 is clearly inadequate at just under $30bn for 2010–2012, and a call to mobilise $100bn by 2020 for both adaptation and mitigation costs in developing countries. While these are important steps, the long-term financing proposal falls short by at least half; has no source or commitment of shares by developed countries; and does not mention how finance will be divided between adaptation and mitigation. Much of the short-term finance is to be met through loans and existing aid

finance diverted from other priorities, such as health and education, to climate change.[26] In the absence of comprehensive national plans and appropriate levels of international (and national) finance, governments and their services are simply not geared up to respond to the challenges of climate change facing the communities they serve.

Box 3: Climate Change Coordination Unit, Uganda Ministry of Water and Environment

Creating new capacity: The Uganda Ministry of Water and Environment received $1m from the Danish Government to establish the Climate Change Unit and build capacity throughout the government on climate change. The project comprises three parts:

1. Establish the Climate Change Unit (supported by project funding over four years, with commitment from the Uganda government to maintain the Unit beyond that period);
2. Build capacity in the Uganda delegation at the UNFCCC negotiations;
3. Mainstream climate change into government planning processes.

The Unit is located within the Ministry of Water and Environment and seeks to engage throughout government and planning across all sectors. At inception, all ministries were invited to a national workshop to discuss the impacts of climate change on Uganda in all sectors; and to introduce the role of the Unit to co-ordinate adaptation and climate-aware planning in all areas. The Unit seeks to support each sector through bilateral meetings focusing on their specific challenges and to advise on integrating climate change into their plans and strategies. They also highlight the additional cost of working in a changing climate and encourage all ministries to factor climate change into their budgets. Moreover, the Unit co-ordinates national implementation of the UNFCCC by working with all ministries to help them understand their responsibilities under the Convention.

According to Paul Isabriya, Adaptation Officer in the Ministry of Water and Environment, *'... in our country we are trying to sensitise all sectors to what they must do. So while talking about adaptation we also talk about how to implement the Convention into the sectors. It's starting the mainstreaming in a sensitive and knowledge-based way. Previously, with mainstreaming, people have had to come up with frameworks for mainstreaming gender or the environment, but these have been requirements for donors, so it's just used in a proposal to the donor and it's not internalised, institutionalised – there is no learning. But with climate change, we need to be innovative and that will only come with real awareness that the only way [ministries and sectors] can achieve their plans is by understanding the threat of climate change and how to address it. We do not need guidelines that people won't follow; this is too serious. We need people with their own ability to understand the problems and the solutions. This will be easier to do if more resources come in to demonstrate the importance of addressing climate change in every sector.'*

Scaling up existing capacity: In terms of whether the NAPA is being implemented, Mr. Isabriya replies: *'Yes and no. In a way it is being implemented. For example, there is already a meteorological service; there is already some money in the budget for this. Previously we thought this was enough for us – our climate was good, very conducive for agriculture, reliable – but now with the changes we are experiencing, this level of investment is simply not enough, we need additional resources to strengthen this institution. We are already doing tree planting, but we can't keep up with the amount that needs to be done. With water and sanitation, of course we already invest, but with increasing extreme events there are problems, and the way the sector plans is not with the intention to manage climate change, but as a service to the people, now climate change makes it harder to deal with these new challenges without much more investment. So the water sector is revising their sector investment plans to take account of climate change, which will require more money to implement. But when will this come? What can be done is being done, but without more investment we cannot implement the NAPA as planned.'*

Source: Interview with Paul Isabriya, Adaptation Officer, Climate Change Unit, Ministry of Water and Environment, Government of Uganda, May 2009.

3 Adaptation: what is needed?

In its Fourth Assessment Report, the IPCC concluded that 'warming of the climate system is unequivocal'. [27] But while the process and extent of global change are becoming better understood all the time, the understanding of climate change and the impacts it will have on smaller geographical scales are still elusive. This is primarily due to the uncertainties inherent in systems science, through scenario, model, and parameter uncertainties. [28] Even the direction of rainfall change (whether the climate will become wetter or drier), is unclear for the Sahel, let alone by how much. Uncertainty is further compounded when the impacts of climate change on, for example, crop yield, hydrology, or transmission rates of an insect-borne disease are estimated, because each of these also has its own scenario, model, and parameter uncertainties.

Yet it is micro-level information that communities, local and national governments want to inform their adaptation planning; such as, how will the yield of maize change in individual districts or countries by the end of the century? Science cannot accurately answer these questions beyond a timeframe of about the next 25 years. While investing in knowledge generation around local impacts of climate change is an important aspect of adapting, the inherent uncertainties of climate models demands an approach to adaptation that isn't dependent upon this information, in effect, an approach that manages uncertainty and fosters adaptive capacity. So the key questions for approaching adaptation are:

1. What adaptation interventions will work, based on the available information for shorter planning timeframes and in the face of systemic uncertainty in the future?
2. What process will best yield these interventions in a manner that will support the most vulnerable to adapt to climate change?

3.1 What works with uncertainty?

Vulnerability or impacts-focused?

Adaptation is often seen as a choice between reducing general vulnerability (for example by improving people's incomes or by diversifying their livelihood strategies), and preparing for specific hazards, such as floods. This choice between addressing the underlying causes of vulnerability to climate change impacts (start-point vulnerability), and a 'predict and adapt' model for specific climate-hazards (end-point vulnerability) is an artificial choice on the ground, where a combined approach is needed. The Development and Adaptation Continuum[29] separates activities in this way, and while it helpfully illustrates the role that vulnerability (and poverty per se) plays over and above exposure to climate risks, and highlights the important role of development to reduce vulnerability to climate change, by separating out the focus of activities, the real scope of adaptation in any one location is not articulated. Indeed, McGray *et al*., note that of the adaptation projects reviewed for the Continuum, 65 per cent of the examples they characterised as 'addressing the drivers of vulnerability' (the 'development' end of the Continuum), also included activities that focused on the impacts of climate change (the 'confronting climate change' end of the Continuum).[30] This is the reality of adaptation on the ground, where all these elements must be addressed. For example, if likely impacts such as increased drought conditions are not considered when diversifying agricultural livelihoods, maladaptation is likely.[31] Equally, if insecurity of women's land tenure is not

addressed alongside adapting agricultural practices, then their future in a changing climate is not secured.

Certainty or uncertainty?

In any given location, the precise impacts of climate change are not known. However, an understanding of emerging trends, likely changes, and levels of vulnerability to specific changes can be built up from a variety of sources including local observations and meteorological data. Assessing what is known about the climate change impacts, what is uncertain (the known unknowns, so to speak), the factors that limit adaptive capacity, and addressing all these areas make up the full continuum for adaptation.

Known impacts: For specific impacts that are likely, interventions can be targeted towards this. For example, the Western Hills of Nepal have experienced a 1.8°C temperature increase over the period 1975 to 2006.[32] With temperatures likely to continue to rise over the next 20 years,[33] crop production will be directly affected and crop water demand will increase. Interventions that introduce more heat-tolerant or drought-tolerant crop varieties, increase soil water retention, and provide water for household and productive use will help communities faced with these problems.

Uncertain impacts: For impacts where the direction and scale are not known, interventions will be needed that manage risk and uncertainty. For example, climate models for the Sahel conflict in their predictions of increasing and decreasing rainfall; therefore adapting to either conditions risks maladaptation. Instead, interventions are needed to collect and analyse climate data to work towards more accurate models in coming decades; to spread risk, such as through insurance mechanisms, diversifying livelihoods, selecting crop varieties that perform well over a range of rainfall conditions; to understand and manage risks, such as through community disaster committees; and to build resilience to unexpected shocks, such as through social protection measures.

Factors that limit adaptive capacity: Adaptation must also address issues that would otherwise hinder the ability to take action in both the areas above, such as unfavourable policy environments, marginalization, etc., as well as actively build adaptive capacity. These existing conditions can limit people's ability to shape, create and respond to change, therefore leaving them vulnerable to climate change impacts. Measures that ensure women's rights, empower poor and marginalized communities to be involved in decision making, provide education and health care, secure land tenure, and ensure access to key resources and services are needed.

An approach to adaptation that works, even with uncertainty, combines activities that:

- address current hazards, increased variability and emerging trends;
- manage risk and uncertainty; and
- build adaptive capacity.

Resilience or transformational change?

This combined approach moves adaptation beyond building resilience (the ability to absorb climate shocks or to ride out changes) towards making the transformational changes that are needed to move communities from being victims of climate change to actively pursue opportunities and allay the negative consequences of climate change. Bouncing back after a shock is not enough if the shocks become more frequent; a change is required in order to ensure livelihoods in a changing climate.

Transition or the process of change?

Climate change adaptation is about making a change, but it is not a transition from one set of climate conditions to another. There is no end-point to adapt to. Adaptation is an

iterative change-process. Therefore, where interventions address identified likely impacts, flexible mechanisms are required to reassess the suitability over time. Building adaptive capacity includes addressing current conditions that limit people's ability to shape, create, and respond to changes, and also create the conditions needed to identify and respond to future changes and hazards, such as through knowledge generation, innovation, social willingness to make changes, and through the availability of alternatives and options.

Robust or optimal decision making?

Limited climate change information is often seen as a barrier to adaptation, but the inherent uncertainties in climate modelling, plus the lack of local-level modelling, demand an approach to adaptation that doesn't rely on this sort of information. A 'predict and adapt' approach risks maladaptation, as the parameters that are being adapted to are narrowed by reliance on one projection; and therefore doesn't manage uncertainty, allow for flexibility, or the enhance the ability to make further changes. The continuous nature[34] of climate change demands investment in both the process of being able to change as needed (adaptive capacity) and time-bound interventions and policies based on robust rather than optimal decision making. For example, in agriculture, crop varieties may be selected for their optimal yields. However, these might only be successful under very precise conditions, which can no longer be guaranteed; so in a changing climate, crop varieties that are reliable over a wider range of likely parameters are a more robust choice.

A robust decision-making approach compares all interventions, activities, and policies that would be feasible and appropriate (e.g. socially desirable, affordable, technically feasible), against available information relevant to the lifespan of that intervention. For example, if an intervention is expected to last 10 years, then current variability and observable trends are likely sufficient. Relevant information can be drawn from a variety of sources to inform this decision, from communities to meteorological departments. For example, in Andhra Pradesh in India, local observations of 'greater water scarcity' contributed to the selection of a programme to de-silt traditional water tanks rather than to construct a new $4bn dam.[35] For long-term infrastructural measures such as sea walls, reservoirs, or large-scale irrigation systems, greater attention will need to be paid to the range of climate change scenarios and their limitations. In such cases, the use of the precautionary principle would be appropriate, as would flexible, iterative planning and review processes that reassess adequacy over time.[36]

What is an adaptation intervention?

By assessing interventions against the goal of adaptation, the need to define specific activities as 'adaptation' is removed. It is the process of assessing what is needed in light of what is known about the climate change impacts, what is uncertain, and the factors that limit adaptive capacity in a given location, and then selecting appropriate interventions and policies to achieve this. For example, in rural livelihoods, sustainable livelihoods, natural resource management, and DRR approaches would be used in combination to achieve adaptation (see Section 3.3).

3.2 What processes work for those most vulnerable?

Globally, urgent and immediate finance is needed for adaptation in developing countries. Nationally, all ministries need to engage as a matter of priority with the reality of climate change and to develop responsive planning and investment. Locally, those hardest hit by the impacts of climate change will be the communities and individuals most vulnerable due to their livelihoods or location and least supported by existing institutions and services. Sector-wide nationally applied adaptation will not reach these

people. Reaching these vulnerable communities and individuals in order to prevent them from becoming victims of climate change and to enable them to make informed decisions about their lives and livelihoods in a changing climate, is the considerable challenge facing national adaptation.

The concept of 'human security' provides a useful way to think about how to strengthen people's ability to withstand the impacts of climate change and to emerge from poverty.[37] The UNDP's 1994 *Human Development Report* first put forward a human security approach that united emergency response and development in a single framework.[38] It was based on three propositions:

1. People vulnerable to shocks are agents of their own destiny, with a series of rights that need to be fulfilled.
2. Governments and international bodies are bound to address the full range of risks and vulnerabilities that affect people living in poverty.
3. Social, political, and economic stability, generally ignored or downplayed in debates on poverty reduction, equity, and growth, is fundamental for reducing risk.[39]

The approach challenges governments and international bodies to build from the bottom up, by enabling and complementing the efforts people make to reduce their own vulnerability and to protect themselves from risk, while providing top-down protection and investment.[40] These propositions are pertinent to adaptation, and speak to the need for:

- Community-level design and implementation of adaptation strategies, and national-level commitment to creating the means and conditions to enable people most vulnerable to adapt;
- Global provision under the UNFCCC and integrated national planning, focusing on the needs of people most vulnerable and addressing all factors that increase vulnerability and limit adaptive capacity;
- Strengthening livelihoods in a changing climate by addressing the adaptation deficit and managing risk factors.

This approach illustrates the complementary nature of the top-down and bottom-up processes that need to be applied in order to adapt to climate change.

Box 4: 'Jasmine Rice in the Weeping Plain' – climate change adaptation in Thailand

Oxfam has been working with the local organisation Earth Net Foundation (ENF) since 2004, promoting organic agricultural production and Fair Trade marketing with farmers in Yasothorn Province, Thailand. A combination of scientific findings and observed changes by communities and programme staff prompted Oxfam to take action. In consultation with farming communities and ENF, Oxfam implemented an initial one-year pilot climate change adaptation project. A total of 57 out of the 509 organic-farming households decided to join the scheme.

Activities

Climate change awareness and participatory decision making: Men, women, and children were educated about climate change and its potential impacts in Thailand. Using this information, participants shared ideas about how they could adapt their farming practices to cope with these changes, and they designed their own on-farm water-management systems.

Provision of loans to project participants: A fund was established that provided loans of up to Thai baht (THB) 30,000 (approximately $880[41]) to each household to assist in the construction of on-farm water-management systems. The loans are offered at low interest

rates (1–3 per cent) for one to six years. The fund lent money to all 57 households; THB 1.4m (or $41,000) in total.

Implementation of on-farm water-management systems: In total, 23 stock ponds, 24 wells, 44 water-drainage systems (ditch, sprinkle, pipe), and 14 water pumps were designed, built, and installed. Given the uncertain impact of climate change on rice production, farmers also diversified their food crops. Many farmers, especially women, grew vegetables and planted fruit trees as alternative crops, thereby earning households between THB 500 to 1,500 ($15–40) per week.

Farmers as catalysts: Female and male farmers who took part in the project met with other farmers and households to share their experiences in order to help others to find better solutions to the problems posed by a changing climate. Several workshops took place, including one on agricultural models and techniques to reduce climate risks; three on the impact of climate change on the roles of female farmers; and three on on-farm product management and seed management for female farmers.

Key outcomes

Food security: After harvesting, it was found that all 57 households were more food-secure than they had been before the start of the project, with more than 90 per cent of the rice, meat, and vegetables consumed grown by the families themselves.

Decline in rice production halted: Despite the year's harsh conditions, 51 out of the 57 households were able to maintain an output of rice that was at least sufficient for their own household consumption, with 14 producing a surplus to sell at market. Only six households suffered losses in rice yield, because their water systems were not established in time. Overall, rice production fell by almost 16 per cent – in stark contrast to farms that did not take part in the project, whose production fell by 40 per cent.

Diversity of crops: Programme participants adopted crop diversification as an additional way to reduce the risk of food and economic insecurity. Farmers, especially women, planted fruit and vegetables during and after rice cultivation; the produce not consumed by their households being sold at local markets, earning them around THB 500–1,500 ($15–40) a week.

On-farm water-management systems: More than 90 per cent of participants agreed that the water-management systems reduced the impacts of drought. Almost 90 per cent believed that the systems were appropriate for women and children to use, and they were already finding ways to improve their water-management systems.

Source: Oxfam GB (2009) Disaster Risk Reduction and Climate Change Adaptation Resources: Case Study 'Jasmine Rice in the Weeping Plain: Adapting Rice Farming to Climate Change in Northeast Thailand (Authors: Supaporn Anuchiracheeva and Tul Pinkaew), available at http://www.oxfam.org.uk/resources/policy/climate_change/climate-change-adaptation.html

Oxfam's experience with organic rice farmers in Yasothorn Province, Thailand (see Box 4), illustrates the combined need of bottom-up and top-down activities. Firstly, it shows that individuals and communities can develop effective solutions themselves; after all, they know their own particular context better than anyone else. Second, that access to information is key; while the farmers were well aware that the weather was changing, they needed the external input about climate change to be able to make informed decisions about their future activities. Thirdly, that these solutions can only be implemented in an enabling environment, which, in this case, involved NGO grants and technical support. However, for more widespread coverage and sustainability, these services will need to be provided by governments at the local level. National adaptation planning must therefore consider the processes that can provide the information, services, and enabling environment for communities living in poverty to adapt to climate change.

Access to information

Although communities are aware that weather patterns have changed, they are not always aware of exactly which factors have changed (for example, where rainfall patterns and temperatures have changed, it might be only the change in rainfall pattern that is obvious). These changes are often attributed to factors such as deforestation, an 'act of God', or some other locally caused problem.[42] By linking these observations with information about emerging local trends, global climate change, and local impacts, individuals and communities can be empowered to make the transformative actions necessary for them to adapt. Without this input, they continue to rely on unsustainable and often damaging coping strategies, assuming (or simply hoping) that 'things will be better next year'. Instead, negative trends continue and assets and resources become further depleted, perpetuating a cycle of poverty. Awareness raising in general, and climate- and weather-specific information in particular, enable people to respond appropriately to current variability and expected changes over time.

Generating this information requires investment at the national level, where meteorological services are under-resourced in most developing countries. The demand for climate information will occur at multiple levels; everyone from policy makers to subsistence farmers needs accurate and timely information that is relevant to the decisions they have to make. This information must satisfy two requirements: firstly, it must be tailored to the different needs of different groups of people, and secondly, those people have to receive it. National policy makers and local planners might require different information over different planning timeframes, one to allocate forward-looking budgets and one to implement short-term planning initiatives or identify vulnerable communities for urgent action. Communities themselves might require different information again, like early warning for extreme weather events, or seasonal forecasts. Participatory processes can help to generate an understanding of the kinds of information needed at the local level, as well as the best way to communicate it.

Communicating the information in a timely and accessible manner may require addressing barriers such as lack of infrastructure; different local languages; differentiated access (which people have access to a TV, internet, a notice board or a radio?). Communities in remote locations are particularly vulnerable and could be excluded through factors such as a lack of electricity, roads, or high rates of illiteracy. Information is most accessible when communicated in the local language and in a medium that is culturally appropriate but ensures that everyone has access; for example, women can be excluded if information is shared in public spheres to which they don't have access.

Agricultural extension services are well placed to provide relevant information to rural communities, but currently climate change awareness within extension services remains limited and services often do not reach marginalized areas, or men and women equally, so using this medium would also require investment and prioritisation. Adopting innovative methods of communication from DRR early warning schemes, such as using mobile phone alerts, could also be useful tools to complement wider services.

Participation

Due to the location-specific context of climate change impacts and vulnerability, adaptation design and implementation is needed at the local level to be successful. Those whose livelihoods and resources are threatened by climate change are key to identifying their problems and designing effective solutions, drawing on their wealth of skills and local knowledge. Active participation by local communities in their own adaptation efforts increases human security and ensures that other processes that impact on adaptive capacity can be identified, including different roles and responsibilities within communities, such as women's unpaid work in care giving and household labour, which are often overlooked. Good development practice shows that cultural appropriateness,

ease of use, ownership and engagement, and impacts on labour or roles and responsibilities, directly affect uptake of activities; and the same is true for adaptation. For example the 'Views from the Frontline' review of DRR implementation found that the greatest progress has been made in countries that adopted community and local-level approaches, including Bangladesh, Indonesia, Nicaragua, Philippines, and Sri Lanka.[43]

Though the merits of participatory processes are widely accepted and articulated in development practice, key groups are still often overlooked, which can simply reinforce existing inequalities and marginalization, and is not conducive to effective adaptation for the most vulnerable. Lessons from other processes include promoting women's needs and perspectives through more active roles for women and their organisations in discussions and decision making, encouraging balanced representation of women and men in all processes, and using the knowledge and specialised skills of women in the design and implementation of adaptation strategies. The private sector is another key group that is often overlooked and must be involved, through dual roles in terms of addressing unsustainable practices that lead to land degradation (such as monocultures, mining, and logging, etc.) and investing in developing solutions (for example, by developing more drought-, flood-, or heat-tolerant crop varieties).[44]

A national enabling environment: finance, capacity building, and integration

Climate change is a new and additional burden that developing countries are facing. Existing investment will not be sufficient to adapt to the range and scale of climate change impacts that countries face. International finance that is adequate and predictable, and already due through the principles of UNFCCC, is required urgently by developing countries to support or begin their process of adapting to climate change. The location-specific nature of adaptation is clear, which means that international finance should not be prescriptive, as governments will need the flexibility to respond to their particular national and local needs, but a focus must be placed on reaching the most vulnerable.

Considerable investment is required in the institutions, processes and people needed to deliver adaptation. Capacity building includes increasing understanding at all levels (bottom-up and top-down) about the problems climate change is causing, the processes by which services are delivered, barriers to access, and differentiated needs. Effective participatory processes require investments of time, skills, and resources, as well as coordination, prioritisation and institutional capacity at the national level. Coordinating bodies for adaptation to climate change are being established in some countries, North and South, including, for example, the United Kingdom, Finland, Uganda (see Box 3), and Bangladesh. These tend to focus on coordinating national adaptation planning processes and research, through collaboration across government departments, local communities, civil society, the private sector, and academia.

Lessons drawn from National Action Plans (NAPs) under the United Nations Convention to Combat Desertification (UNCCD) show that national coordinating bodies are seldom successful unless they are appropriately resourced, possess high-level political backing, and are representative.[45] Planning processes led by environment ministries (rather than a cross-ministry approach) tend to be sidelined by other departments and sectors, becoming an 'environmental ghetto'.[46] Planning processes that are participatory and that include key government ministries and stakeholders, especially those that deliver directly to communities such as local government and civil society, are more likely to be responsive to local needs and more integrated into other processes. Lessons from the National Biodiversity Strategy and Action Plan (NBSAP) process emphasise this importance, with many examples of lack of ownership hampering implementation. According to Sharma (2009), NBSAPs 'did not generally succeed in engaging all major stakeholders – particularly mainstreaming the issue into action of government departments, local communities, women, and the private sector. The preparation process was dominated by biodiversity specialists and nature conservation

organizations, without the capacity to engage economic sectors and forge links with mainstream development planning... Many NBSAPs faced a problem in getting key and influential decision makers at the national as well as local levels to "buy in" to the planning process. High-level involvement of key players, sectors and departments was lacking in the consultation process.'[47] Political leadership from the top, and participation from the bottom, are therefore both needed. In the case of India's NBSAP experience, a truly participatory bottom-up process can be undone by lack of political buy-in (see Box 5).

Local government services, as the level closest to communities vulnerable to climate change, are key to enabling adaptation. But generally, there has been far too little investment in mechanisms and institutions for effective decentralised decision making, community consultation, monitoring and evaluation, and lobbying of central government for resources.[48] Findings from the civil society review of implementation of DRR under the Hyogo Framework for Action show that government promises to deliver at this level have not yet been met.[49] When it works well, decentralised policy making and service provision are more sensitive to local needs and more accountable to the people they serve. In Tajikistan, for example, decentralisation has led to 'better co-operation between the authorities and local communities that can ensure a better response to local communities' needs'.[50] But this is not always the case where powerful elites control local resources. Indonesian civil society organisations report that 'increased regional autonomy has so far not led to a true empowerment of communities, but rather to the emergence of a few "small local rulers" which, it appears, do not act in the best interest of the communities but rather "sell-out" resources of which communities are in need'.[51]

Integrating adaptation into other planning processes, particularly national development planning is advantageous in three ways:

- Development needs, and ease and cost of implementation, have been changed by climate change.
- Investments and knowledge can be shared, and duplication of effort avoided.
- It allows for the identification of policies and gaps in service that are causing vulnerability.

The literature on aid effectiveness and the Accra Agenda for Action clearly demonstrates that the effectiveness of development processes is reduced when there are too many duplicating initiatives. National processes that seek to reduce vulnerability should be aligned, and climate change should be integrated into all national and sector plans. A recent World Bank analysis of poverty reduction strategy papers (PRSPs) concluded that while some linkages were made to climate change, they involved little in-depth analysis.[52] A study in Bangladesh found that while the stakeholders in agricultural policy making recognised the importance of integrating climate change, those actually involved in providing agricultural extension services did not.[53] These examples highlight again the need for targeted and accessible information for policy makers at all levels, awareness raising and participation in all ministries, and the vital role of a co-ordinating body.[54]

Identified barriers to integrating adaptation into national and sectoral planning, include informational, regulatory, financial, and socio-cultural barriers.[55] Climate science is complex and difficult to communicate to non-scientists, such as policy makers and politicians. Decision-making tools do not translate climate information well, particularly with the wide range of probabilities and parameters. Managing the uncertainty associated with climate information often demands different approaches to decision making; such as a switch from an optimal approach (often based on cost-benefit analysis) to a robust approach (assessing success against a wider range of parameters and

incorporating the precautionary principle if appropriate). However, in many instances the necessary data is simply not available, and neither local narrative observations nor participatory processes may sit comfortably with decision makers in their normal approaches to planning decisions.

There may be specific regulations or legislation that actually limit options available for adaptation; as may technological options in-country; and at the bottom line the financial cost of available options may be simply prohibitive. Social and cultural conditions may limit options that are considered to be appropriate, and will shape notions of acceptable risk within robust decision-making approaches.

Box 5: Case studies from India and Honduras

Participatory processes – lessons from India's National Biodiversity Strategy and Action Plan (NBSAP)

India's NBSAP experience holds several lessons for similar planning exercises. The Indian Ministry of Environment and Forests (MOEF) entrusted the task of coordinating the NBSAP to a non-government organization, and accepted their proposal for a large-scale decentralized process across all the states of India. As a result, a diversity of innovative tools and strategies were employed to reach out to thousands of people nationwide between 2000 and 2003, enabling more than 70 state, sub-state, eco-regional and thematic plans to be prepared, in addition to one national plan. Each plan was meant to be an independent, stand-alone document that would be directly referred to for implementation of strategies and actions in the concerned area. Key elements from all plans were finally integrated by the Core Group into a single National Biodiversity Strategy and Action Plan (NBSAP).

The consultation process was regarded as important as the final product, and based on the central tenet that planning for biodiversity conservation should be owned and shaped by as many individuals as possible in an equitable process that allows the most marginalized voices to be heard, especially those whose livelihoods depend on natural resources. Regardless of the final outcome of the plan, the process itself was meant to increase awareness of biodiversity, empower people through participation, and inspire local initiatives to begin implementation of local plans, etc.

The decentralized planning process was successful in mobilizing people to innovate and experiment with tools to reach out to a cross-section of stakeholders. Every state developed a different method of reaching out to stakeholders, and made independent choices about what planning tools and strategies to adopt, including, for instance, biodiversity festivals and radio programmes. As a result, the process was particularly successful at including the voices and views of marginalized social sectors, highlighting the importance of identifying appropriate tools to target specific sectors.

The process also highlighted the importance of participants identifying with, and feeling ownership over, a process in order to participate meaningfully and value the output. In different contexts, ownership can hinge on a range of different issues, such as the type and timing of information disseminated to participants, the type of coordinating agency selected, the opportunity for teamwork, or the language used. The process generated positive spin-offs in terms of learning, networking, capacity-building, and local action.

The eventual fate of the NBSAP held yet another key lesson. When the three-year, people-driven process was completed, the Ministry for Environment and Forests refused to approve the document prepared by the Core Group. The Ministry was reportedly displeased with parts of the plan, including the statement that India's current development paradigm was environmentally unsustainable. While it appointed a separate committee to review the plan, it did not allow the Core Group to access the findings of the committee. It also instructed the Core Group not to make the plan public, which was ironic since it had been prepared through a national, public process.

Therefore, while governments may pay lip-service to participatory planning and decentralized governance, the political acceptability of 'uncomfortable' plan

recommendations and observations can remain in doubt. This final outcome highlights the importance of incorporating a political strategy into such a process in order to gain the support of powerful lobbies for securing official support for the final plan. The process lacked a political strategy and made relatively little effort to take on board the power wielders, namely: influential sugarcane farmers, tea garden owners, industries, trade unions, and politicians. The Ministry could afford to suppress the plan because it was predominantly supported by 'marginalized' groups.

Source: Drawing on T. Apte (2006), cited in A. Sharma (2009) pp16–17.

Integrating environment into development planning in Honduras

Nearly 35 per cent of the population in Honduras lives in areas that are highly vulnerable to drought. Land degradation increases the country's vulnerability to natural disasters. For instance, Hurricane Mitch devastated large parts of the country in 1998, especially in areas where vegetation had been sufficiently degraded to allow floods and winds to develop their deadly power.

The country completed its UNCCD NAP in 2003 under strong leadership from the Deputy Minister of Natural Resources. The NAP identifies five key areas of intervention, namely: sustainable agriculture, watershed management, education, risk and disaster management, and institutional strengthening. It is very much a 'living document' that was revised in 2007 to serve as a common reference for stakeholders.

Subsequently, the Grupo de Trabajo Interinstitucional (GTI, the interagency coordinating unit) has successfully ensured that desertification is part of the country's PRSP and that sustainable land management (SLM) practices are being mainstreamed into decentralized community-level planning processes. The main factors contributing to the success in mainstreaming include the following:

Political leadership: A firm commitment from the Deputy Minister, with support from the Vice President, provided sufficient convening power and political support for GTI to ensure mainstreaming in the PRSP and the review of forestry legislation;

Coordination: GTI has achieved political weight and visibility and has strongly supported mainstreaming at the community and local level;

Impetus from civil society: Honduran civil society has been very active in support of SLM and has benefited from the general high degree of environmental awareness in the country.

Source: A. Sharma (2009) 'Planning to Deliver: Making the Rio Conventions More Effective on the Ground: Climate Change, Biodiversity, Desertification. Eschborn: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), p. 22.

A national framework for adaptation

Climate change impacts, vulnerability, adaptive capacity, and barriers to adaptation are location-specific and will change over time, but the *processes* needed for adaptation that supports the most vulnerable will be similar. Bottom-up as well as top-down processes are key for adaptation, from community-level adaptation design and implementation, to access to information across all levels, to the enabling national-level processes to finance, build capacity, and integrate.

Table 1: Elements of an enabling environment for adaptation

Community	Local government	National government
← Capacity →		
← Resources →		
← Participatory decision making →		
← Access to information →		
← Innovation and learning →		
← Flexible planning →		
← Robust decision making →		
← Addressing factors that limit adaptive capacity →		
• Bottom-up vulnerability assessment • Local design and implementation • Participatory monitoring and evaluation	• Devolved decision making and resources • Bridge bottom-up and top-down processes • Platform for engagement with stakeholders	• Political will • Supportive policy environment • Knowledge generation • Co-ordination • Integration

At the national level, the World Resources Institute (WRI) has developed a framework of functions that provides a useful tool for designing an effective adaptation strategy. The National Adaptive Capacity (NAC) framework defines the functions of a national 'adaptation system' as: assessment, prioritization, information management, coordination, and risk reduction (see Table 2).

Table 2: WRI National Adaptive Capacity Framework

NAC adaptation functions summary	
Assessment	Assessment is the process of examining available information to guide decision making. Adaptation is likely to require iterative assessments over time, including assessments of vulnerability, climate change impacts, adaptation practices, and the climate sensitivity of development activities.
Prioritization	Prioritization means assigning special importance to particular issues, areas, sectors, or populations. For adaptation, prioritization at the national level usually takes into account projected geographic distribution of climate change impacts, as well as differential vulnerability to the impacts of climate change among a country's population. Effective processes for prioritization will engage a wide range of stakeholders, will be made transparent to the public, and will enable review and adjustment of priorities as circumstances change.
Coordination	Adaptation requires action by disparate actors at multiple levels, both within and outside of government. Co-ordination of their activities helps to avoid duplication or gaps, and can create economies of scale in responding to challenges. Co-ordination may be horizontal (e.g., among ministries), vertical (e.g., among national, global, and sub-national actors), or inter-sectoral (e.g., between government and business).
Information management	Information management consists of collecting, analysing, and disseminating knowledge in support of adaptive activities. Relevant information will vary, but at a minimum, typically covers climate variables, the status of natural and human systems, and existing coping strategies. Good information management will ensure that information is useful and accessible to stakeholders. It may also involve general awareness raising, or building the capacity of stakeholders to use information for adaptation.
Climate risk reduction	Different development priorities will face different risks from climate change. Addressing these risks depends on the above adaptation functions, but also requires a distinct process of identifying specific risks to a given priority, evaluating the full range of options for addressing the risks, and then selecting and implementing risk reduction measures. Many risk-reduction measures will entail changing practices in the areas of infrastructure, natural resources management, or social protection. For some countries, it may be useful to treat these three sets of activities as adaptation functions in their own right.

Source: World Resources Institute (WRI) (November 2009) 'The National Adaptive Capacity Framework: Key Institutional Functions for a Changing Climate'.

Crucially, this approach recognises the iterative nature of adaptation planning; just as climate change impacts and societal development are not static, neither can be the response. Adaptation will remain a crucial element of national planning as long as there are excess greenhouse gases in the atmosphere. Consequently, the need to invest in the *means* of planning, implementing and reassessing adaptation is a critical component of adaptation. Learning lessons from the NBSAP, UNCCD NAP and NAPA processes, a national planning exercise will need to establish an effective and durable participatory process for integrated planning, implementation and monitoring, rather than a one-off national consultation process that results in a static national plan.[56] Currently, few

countries have the basic institutions, policy structures and information systems that give them this enabling environment.

The NAC approach provides a strong foundation for the top-down functions required for national adaptation. However, 'Views from the Frontline'[57] (see Box 6), and 'Women's Voices From the Frontline'[58] highlight the central role of local-level action to address the disconnect that can occur between national planning processes and vulnerable communities and particularly marginalized sub-groups such as women. These local-level actions, and the importance of addressing inequality, also need to be captured in a national approach to adaptation.

Sub-national levels of government are vital for adaptation, given that it is the level of government closest to the people vulnerable to the impacts of climate change. In reviewing implementation of the Hyogo Framework for Action, 'Views from the Frontline' found a significant gap between national and local level action on DRR; [59] 'reports of progress at the national level "fade out" as activities get closer to vulnerable people where impact is at best limited and patchy and at worst not happening at all'.[60] Assessments by women were even lower, illustrating that even when vulnerable communities are supported, the needs of sub-groups can be overlooked, thereby leaving them more vulnerable.[61] The review found that where successes were reported, it was largely civil society and not local government actors who were leading the process. It concluded that the lack of resources at this level is preventing faster progress in implementing the Hyogo Framework of Action; '...quantitative and qualitative findings highlight a lack of dedicated financial resources, human resources, training and know-how in local governments as the most common constraints at the local level. Progress to date indicates that conventional "trickle down" approaches to resource mobilisation are not working.'[62] Without targeted action at this level, it would be fair to assume that this would hold equally true for adaptation.

Many governments have processes in place to support decentralised ways of working, including legislation and institutional structures. However, existing structures tend to be hierarchical and do not lead to participatory approaches, which are central to effective DRR and adaptation.[63]

There is growing evidence from non-government organisations (NGOs) implementing community-based adaptation that the knowledge and skills of local communities is a key component to designing and implementing adaptation strategies, given the right support. Just as climate change impacts are location specific, so are the solutions. Many NGOs are demonstrating that successful local adaptation can be enabled through access to vital information and financial resources (see Box 4 for Oxfam's experience with organic rice farmers in Thailand).[64]

To enable national adaptation that focuses on meeting the needs of those most vulnerable to climate change impacts, a wide range of policies and interventions are required through complementary processes that are top-down and bottom-up. National adaptive capacity fostered through such functions as those identified in the NAC framework, is one part of that puzzle. Community design and implementation of adaptation strategies suited to their location and their needs is another. A crucial element of both is the role that local level government and services must be empowered and resourced to play as intermediaries, linking bottom-up and top-down processes.

Box 6: Core recommendations from 'Views from the Frontline'

The Global Network of Civil Society Organisations for Disaster Reduction's review of local-level implementation of the Hyogo Framework for Action produced core recommendations, some of which offer important lessons relevant to implementing local-level adaptation, including:

- Reorient HFA implementation strategies to support a proactive and systematic deepening of engagement with at-risk communities, including participation of most vulnerable groups.
- Recognise the right of at-risk women, men, and children to engage in decision making and planning processes – participation must be clearly defined and explicitly recognised through policy, legal, and institutional provisions.
- Undertake participatory local hazard-vulnerability assessments and associated risk mapping as strategic entry points to raising critical awareness and understanding of risk and to building relationships among different actors. Set specific time-bound targets with clear responsibilities and delegated authority in support of these assessments. Teach children to do this too, using schools as important local centres for community action for disaster risk reduction.
- Use local disaster risk knowledge to inform local programming and action planning of principal development sectors; risk considerations should become routine in all development investment planning and programming.
- Decentralise authority and resources to appropriate administrative levels in support of local multi-stakeholder partnerships (including equitable representation from most vulnerable); to coordinate and manage risk reduction, poverty alleviation, development and climate adaptation policy execution.

Source: Global Network of Civil Society Organisations for Disaster Reduction (2009) 'Clouds But Little Rain ... Views from the Frontline: A Local Perspective of Progress Towards Implementation of the Hyogo Framework for Action'.

3.3 What works for rural communities?

Oxfam has considerable experience working with rural communities on a wide variety of issues, most recently climate change adaptation. While adaptation to climate change is necessary across all sectors and regions, including health, education, infrastructure, and energy, this section focuses on rural development, given that 75 per cent of the world's poor live in rural areas and that rural livelihoods are especially vulnerable to the impacts of climate change.[65]

Adaptation in rural livelihoods needs to respond to the three major problems caused by climate change:

- Climate change is undermining the sustainability of current agriculture-dependent rural livelihoods;
- Climate change is pressurising already depleted natural resources;
- Climate change is increasing hazards that can lead to climate-related disasters.

Agriculture and rural livelihoods

Populations dependent on agriculture are particularly vulnerable to climate change through the climate-sensitive nature of their activities and because agricultural workers

and smallholder farmers in developing countries tend to be among the most disadvantaged and marginalized. This is often compounded further for women due to gender inequality and the impacts of male out-migration in response to climate shocks and failing harvests. Smallholder farmers have considerable experience of dealing with climate variability, and local knowledge helps them to cope during difficult periods. But these 'coping strategies' are largely unsuitable to deal with the sustained changes and increased variability associated with climate change, as they rely on the conditions returning to normal again. As a result, assets are depleted, limiting options for adaptation.

Climate change impacts facing agriculture include[66]

- Decreased yields of major cereals in dry and tropical regions, even with slight warming; an increased number of extreme weather events likely to have greater negative impact than increased average temperatures;
- Increased irrigation demand, coupled with declines in water availability in some regions: due to decreases in precipitation in the sub-tropics (particularly affecting rain-fed agriculture in central America and sub-tropical Africa) and in others due to snow pack and glacier melt;
- Increase in extreme precipitation in production areas in South and East Asia;
- Decreased grassland and rangeland for animals in arid and semi-arid regions; loss of domestic animals during extreme weather events, e.g. droughts;
- Reduced productivity and fertility of animals due to heat stress; increased water requirements;
- Some local extinctions of fish species, and regional changes in distribution and productivity. Economies most likely to suffer are Central and North Asia, Western Sahel, and coastal tropical regions of South America.

Adapting rural livelihoods will require a range of investments, policies, planning and information, including the following:

Access to forecasts: Erratic rainfall patterns and changing seasons are upsetting farming cycles in many parts of the world. Many communities that Oxfam works with are experiencing changes to the seasons, with rainfall being concentrated into fewer, more extreme events, or the delayed onset of rainy seasons.[67] With traditional farming calendars becoming less reliable, farmers need interventions to help them to plan and prepare, including weather forecasts for assessing when to sow and when to harvest, and seasonal forecasts for what to sow and how to manage risk.

Access to appropriate technology: With increasing salinity, flooding, or droughts in many areas, many farmers will need access to seeds for crops that are more salt-, flood-, and drought-tolerant. Developing these varieties is one part of the solution, but so is ensuring that they are widely available where they are needed most, and that access is not hampered by a lack of information, expense, or intellectual property rights. It is important that they work in field settings (not just under laboratory conditions) and that the end user is involved from the outset. Technologies for adaptation should be targeted at the needs of the poorest and most vulnerable people, including women, favouring small-scale technologies that can be taken up and adapted locally.[68]

Changing management practices: Adaptation requires consideration of how people use and manage natural resources, given that this will be under increasing stress from climate change. A number of factors impact on the resource base and on the ability of different groups and individuals to adapt: how resources are used, accessed, or distributed depends on gender, ethnicity, productive use, wealth, and informal and formal mechanisms. Agricultural policy must also be adapted to climate change impacts.

The central role of women in farming in vulnerable communities must be harnessed through their knowledge of local biodiversity and wild foods, and household production; and negative impacts prevented by addressing barriers to women's participation in adaptation measures.

Addressing factors that limit adaptive capacity: Addressing existing conditions that cause vulnerability to climate change or limit adaptive capacity are a vital component of adaptation. Women are often at a particular disadvantage through limited ownership of land, rights to assets, or access to credit. If women have limited control of, or a limited role in decision making around the allocation of and access to assets, they will be less able to adapt. Control of assets and access to agricultural services will be key to enabling effective rural adaptation.[69]

Box 7: Gender roles and vulnerability to climate change

In every society, women and men have different roles inside and outside the household, and different resources to deliver them. In the rural communities of the developing countries where Oxfam works, men's roles typically focus on earning cash by growing food, trading, or selling their labour. But it is largely the role of women to provide the food, fuel, water, and the care that the family needs (all for no pay), in addition to earning some cash. In such communities, women are likely to have:

- greater reliance on **natural resources** – like rivers, wells, reliable rainfall, and forests;
- fewer **physical resources** – such as land, fertiliser or irrigation, and fewer assets (like machinery, or a bicycle) to use to make money, or to sell as a last resort;
- fewer **financial resources** – little cash, savings or access to credit, and less access to markets that give a good price for their goods;
- less powerful **social resources** – due to social and cultural norms that limit their mobility and their voice in decision making, reinforce traditional roles, and put them at risk of violence;
- fewer **human resources** – due to having less education, fewer opportunities for training, and less access to official information.

Source: K. Raworth (2008) 'Coping with Climate Change: What works for women', Oxfam Internal document.

While adaptive capacity must be increased through involvement in decision making, education, and awareness raising, and diversification and risk spreading, provision must also be made for times when risk is simply unavoidable. A number of social protection measures have been tried and tested, including employment programmes; cash transfers and crisis-related transfers to overcome short-term crises and prevent negative outcomes with long-term impacts such as malnutrition, the sale of assets, and withdrawal of children from school; and insurance-related transfers – contributory as well as non-contributory – to insure against loss of products and assets, and also of jobs.[70]

Some examples of these in action include India's National Rural Employment Guarantee Scheme, which guarantees 100 days of employment for every rural household. Brazil's *Bolsa Familia* cash transfer programme has proven its effectiveness in reducing the vulnerability of households at the time of crisis, enabling them to manage shocks better. Oxfam has successfully implemented several cash and food transfer programmes – the report of a recent cash transfer programme in Viet Nam shows that it resulted in improvements in food security and a decline in drop-out rates at schools.

Box 8: NAPA project summaries – Democratic Republic of Congo and Mali

The Democratic Republic of Congo (DRC)

Building the capacity of the agriculture sector in the DRC to plan for and respond to the additional threats posed by climate change on food production ($3.41m).

Objective and benefits: The project aims to secure Congolese exclusively pluvial or itinerant agricultural production, the income source of 90 per cent of the population. Anticipated threats to Congolese food security, such as temperature increase, more frequent and longer seasonal droughts, increasing extreme weather events, and anticipated annual rainfall increase or decrease in different parts of Congo, will be targeted.

Project outcomes:

- Pilot measures will be implemented to secure food crop production and target up-scaling, such as improved meteorological monitoring and forecasting; local interventions to improve reactivity and resilience to climate change induced agricultural pressures;
- Current capacity gaps will be responded to, to manage climate change risks in the agricultural sector through investments, training, and updated observation data;
- Farmers will be provided with updated vulnerability/risk and impact maps; seasonal forecasting and agro-meteorological bulletins for agricultural services; and an agro-hydro-meteorological assistance system to enable development of dynamic agricultural calendars. Farmers' capacities are strengthened to enable them to design and implement strategies that respond to climate risks through co-operation between research institutes and meteorological and agricultural services. A national monitoring system for yields and an early warning mechanism for food shortages will be established;
- Pilot adaptation measures will be implemented in Bas Congo, Equateur, Kasai Oriental, and Katanga, including diffusion of climate-tolerant varieties of maize, cassava, and rice; selected farming techniques and 'climate resilient' soil, water, and crop management techniques; and updating of crop calendars and technological packets to farmers;
- Where agriculture is heavily threatened by emerging climate change hazards, livelihood diversification options will be developed.

Mali

Enhancing adaptive capacity and resilience to climate change in the agriculture sector in Mali ($3.41m).

Objective and benefits: The project aims to enhance adaptive capacities of vulnerable rural populations to the additional risks posed by climate change on agricultural production and food security. It will improve national capacities to prevent and manage the impacts of climate change, and strengthen the most vulnerable agro-pastoral communities. Best practices generated will be disseminated nationally.

Project outcomes:

- Food security in Mali will be transited towards climate resiliency through enhanced ability of small farmers and pastoralists to cope with increasing climate variability; systematic integration of the risks associated with climate change and variability into key agriculture development policies, plans and legislation; and strengthened institutional capacity to prepare and respond to looming threats on food production;
- A paradigm shift in agricultural development in Mali is expected through simultaneous focus on enhancing food security; promoting resilient rural household livelihoods; lowering climate risks; and facilitating access to adaptation technologies.

Source: Global Environment Facility (GEF) (2009).

Natural resource management

Climate change makes the wise management of natural resources even more important in order to safeguard rural livelihoods. This is because, first, climate change increases resource scarcity. For example, in areas that are becoming drier and in coastal areas suffering from saline intrusion, there is a reduction in the availability of water for household and productive use. Second, the role that natural resources play in buffering communities against extremes of climate becomes more important as climates become more adverse. For example, increasing the soil's organic content improves water retention and drainage which can help crops where rain becomes more concentrated in heavy downpours (even when there is no change in the overall level of rainfall each year), while reforestation can reduce local temperatures; provide additional income; protect against soil erosion, landslides, and local flooding; and provide food and fodder in times of scarcity.

Natural resource management seeks to maintain and strengthen resources such as soils, water and vegetation through a variety of means, including forest management, agroforestry, livestock rearing, water resource management, and coastal protection. Protecting and enhancing these common resources are more vital than ever under the increasing environmental stresses caused by climate change, particularly in developing countries where climate change will exacerbate existing environmental degradation. Not only can natural resource management support adaptation to climate change, it can also offer significant mitigation opportunities; potentially a win–win situation. It is estimated that agriculture could 'fix' gaseous carbon – and hence reduce net greenhouse gas emissions – at a rate of two to three billion metric tonnes of carbon per year for the next 50 years. Measures to achieve this include restoring degraded soils and planting trees.[71]

There are many examples of ecosystem restoration being used as a cost effective and environmentally sound means of reducing risk to climate hazards. In Viet Nam planting and protecting 12,000 hectares of mangroves cost approximately $1m but reduced the costs of sea dyke maintenance by $7.3m per year.[72]

Community involvement is a critical aspect of natural resource management. Private sector or government activities that displace local communities and deny them access to the resources on which they depend do not deliver adaptation, and only increase insecurity and marginalization, thereby limiting adaptive capacity.

Box 9: Watershed restoration and development in Maharashtra State, India

In the semi-arid region of Maharashtra State in India, the Watershed Organization Trust is assisting poor, rural communities to increase their livelihood security by supporting watershed restoration projects. With rain-dependent livelihood systems, these communities survive on limited water supplies to feed their crop and livestock production and cottage industries. The combination of recurring droughts and human pressures on the surrounding land has degraded watersheds. Barren and eroded lands are unable to absorb and retain water, thereby accelerating surface runoff and soil erosion, and inhibiting groundwater recharge. The resulting decrease in soil fertility and water availability has created drought-stressed communities vulnerable to the impacts of climate change.

Working on a micro-catchment basis, rigorous watershed restoration measures designed to regenerate and conserve micro-catchments have been undertaken, including: soil, land, and water management, e.g. trench building to control erosion, improve soil fertility, and enhance groundwater recharge; crop management; afforestation and rural energy management, e.g. a ban on tree-felling, instead planting shrubs and grass to meet household fuel needs; livestock management and pasture/fodder development, e.g. grazing restrictions leading to the natural regeneration of grass and shrubs. These projects have been supported by other measures, including micro-lending, training in new techniques and the formation of self-help groups, to diversify livelihoods.

Increased soil cover, improved soil moisture regimes, increased well water levels, biomass regeneration and dramatic increases in fodder availability, milk production, and vegetable farming are some of the results reported by participating villages. Coupled with micro-enterprise development and an increase in savings groups, these results have translated into more secure livelihoods, diversified asset bases, and reduced exposure to climate-related shocks.

Source: United Nations International Strategy for Disaster Reduction (ISDR) (2009) *Global Assessment Report on Disaster Risk Reduction*, 'Risk and Poverty in a Changing Climate: Invest Today for a Safer Tomorrow', Geneva: United Nations.

Disaster Risk Reduction

Every year, more than 200 million people are affected by disasters, such as droughts, floods, cyclones, wildfires, and earthquakes.[73] Disasters have a disproportionate impact on poor communities in developing countries. For example, while only 11 per cent of those exposed to hazards live in developing countries, 53 per cent of disaster mortality occurs in those countries.[74] According to the Global Assessment Report on Disaster Risk Reduction, a 'range of underlying risk drivers, such as poor urban governance, vulnerable rural livelihoods and declining ecosystems, contribute to the translation of poverty and every day risk into disaster risk'.[75] At all levels, it is people living in poverty who suffer most in terms of higher (relative) economic losses and mortality rates, as their vulnerability stems from living in such hazard prone areas as flood plains, deforested hillsides, and urban slums. Hazards become disasters when people are already vulnerable.

Climate-related disasters have increased in frequency and/or intensity as a result of climate change. The trend is already noticeable, with a dramatic and continuing rise in the number of small- and medium-scale climate-related disasters; since the 1980s, the average number of people reported as affected by climate-related disasters has doubled from 121 to 243 million a year.[76] By 2015, Oxfam's projections suggest that this number could grow by more than 50 per cent to an average of over 375 million people.[77] The Global Assessment Report concludes: 'Climate change magnifies the interactions between disaster risk and poverty. On the one hand it magnifies weather-related and climatic hazards. On the other hand, it will decrease the resilience of many poor

households and communities to absorb the impact and recover from disaster loss, due to factors such as decreases in agricultural productivity, increases in disease vectors and shortages of water and energy in many disaster prone regions. Climate change, therefore, is now a key driver of disaster risk.'[78]

Reducing vulnerability is the key to minimising the impacts of disasters, and disaster risk reduction (DRR) is a proven and cost-effective approach to achieving this. DRR is defined as 'the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events'.[79] The Hyogo Framework for Action is a set of guidelines adopted by governments around the world to assist them in their implementation of DRR in communities and nationally.[80] The goal is that, by 2015, losses caused by disasters will be substantially reduced, measured in lives lost, and in loss of social, economic, and environmental assets of communities and countries. The framework is based around five 'priorities for action', namely:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation;
2. Identify, assess, and monitor disaster risks and enhance early warning;
3. Use knowledge, innovation, and education to build a culture of safety and resilience at all levels;
4. Reduce the underlying risk factors;
5. Strengthen disaster preparedness for effective response at all levels.

The step-rise of climate-related disasters means that DRR is a vital component of climate change adaptation. Equally, climate change analysis must become a vital component of DRR planning. For example, if it is known that climate change is likely to increase the severity of flooding three-fold (i.e. a once-in-50-years flood will happen every 16 years or so), then the design of flood shelters and other interventions must take this into account. Where altering climate hazards are uncertain, a precautionary approach must be taken guided by observable trends and likely changes. For the five priority areas of action, climate change means:

1. Climate change impacts are increasing the urgency and need for prioritising disaster risk reduction and climate change adaptation nationally and locally. Investment is needed in strong institutions that can assess the impact of climate change on disaster-hazard profiles and local livelihoods and act accordingly.
2. These institutions will require adequately resourced research and meteorological services to understand the changing risk pattern over time due to climate change.
3. Knowledge, innovation, and education are key to building a culture of safety and resilience to disasters, as well as to empower people to make appropriate decisions regarding their livelihoods in a changing climate and build adaptive capacity.
4. Climate change increases the urgency of addressing causes of start-point vulnerability, and changes the everyday risks associated with living in poverty.
5. Climate change is increasing the frequency of disasters, and thus the urgency and scale required for strengthening disaster preparedness.

Box 10: DRR and public health in Kenya

Wajir is one of the poorest districts in Kenya. Repeated droughts over the last ten years have resulted in losses of up to 70 per cent of pastoralists' livestock. Periodic flooding has damaged water pans, pumping stations, and shallow wells. Oxfam has repeatedly made emergency public health responses to both drought and floods, and has distributed food aid annually as a short-term response to chronic food insecurity.

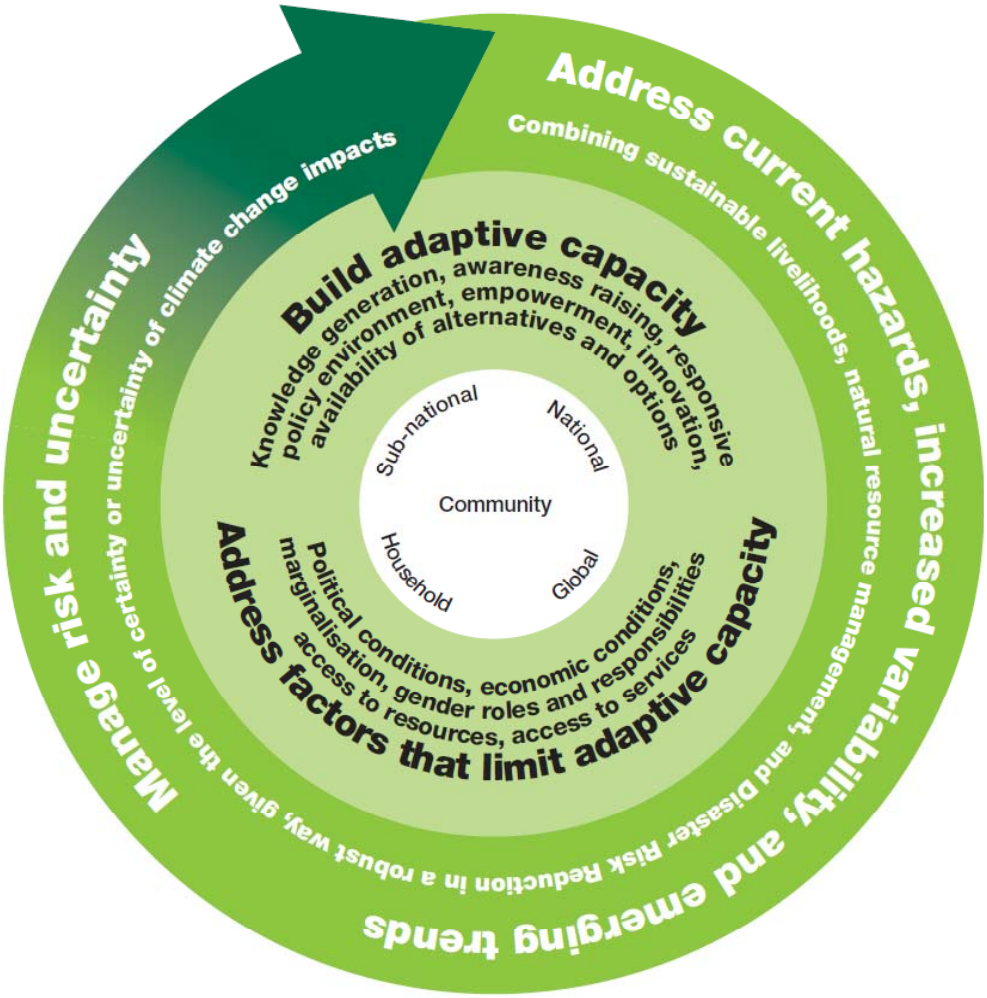
From 2007, Oxfam initiated a DRR approach to increase the resilience of 35,000 pastoralists to drought and flood in the longer term and, in doing so, assessed and responded to risk more comprehensively than before. The DRR components of the programme include:

- Expanding the number of water sources and reducing reliance on boreholes, using appropriate technology such as hand-pumps, solar-powered pumps, and water pans;
- Improving the design of water sources to counter hazards (e.g. covers for shallow wells);
- Implementing hygiene promotion activities through schools;
- Training Water User Associations (WUAs) to manage water sources;
- Raising awareness among communities of their rights under the 2002 Water Act, and supporting them to hold WUAs to account.

As a result, animal health has improved and livestock losses were much lower than usual during the recent drought period, thus enabling pastoralists to maintain their livelihood asset base. They spent less time herding to distant water points and were able to focus on income-generating activities. Increased availability of water for drinking and washing, combined with improved sanitation and hygiene practices, has led to an increased resistance to disease (including malaria and cholera) during the dry season. WUAs are demonstrating that they can operate accountably, thus increasing their legitimacy, financial stability, and ability to demand resources from regional government.

Source: Oxfam GB (2009) 'Disaster Risk Reduction Programme Policy Guidelines' (internal document).

Figure 1: Oxfam's approach to climate change adaptation



1. Communities are at the centre of Oxfam's approach to Climate Change Adaptation; however, enabling them to adapt requires working across multiple levels from household through to global.

2. In order to build adaptive capacity, factors across all levels that limit adaptive capacity must be addressed alongside actions that actively build capacity to adapt to climate change.

3. Interventions are required that span the range of what is known and unknown about climate change in a specific location. This range starts with addressing the current hazards, increased variability, and emerging trends, and extends through to managing risk and uncertainty of impacts where the direction and scale are uncertain.

Building solutions for climate change adaptation in rural livelihoods

Communities are on the frontline of climate change impacts, and must be at the heart of action to adapt. But their ability to adapt is influenced by factors at multiple levels including global financing provision, national policy environment, sub-national planning, and gendered roles and responsibilities in the household. Action on climate change adaptation must occur across all these levels in order for the investment, knowledge, and skills needed to design and implement adaptation to be available at the community level.

There is a wealth of experience from sustainable livelihoods, natural resource management and DRR approaches that offer valuable options for adaptation if they are incorporated into a climate change approach. And there are relevant interventions that span the range of adapting to current hazards, increased variability, and emerging trends, through to managing the risk and uncertainty of future climate change impacts on rural livelihoods. Table 3 provides a number of examples of interventions that can contribute to climate change adaptation when selected through a robust decision-making process that considers the local context. For example, where an increase in temperature has led to an increase in demand for water for crops and/or reduced water availability, interventions could include:

- Access to more drought-tolerant and/or faster maturing crops and varieties (which need less water);
- Practices that increase soil organic content, thus increasing the moisture retention and/or nutrients in the soil (less water needed);
- Water-conserving crop management practices, for example ridge planting (needing less water);
- Water capture and storage for irrigation purposes (to ensure water availability);
- Advocacy to secure rights of access to water supplies for small-scale farmers (to ensure water availability).

In circumstances where the direction and scale of changes are unknown, then interventions could include:

- Crop insurance;
- Livelihoods diversification;
- Increase the soil's organic content to improve water retention and drainage;
- Reforestation to protect embankments, reduce local temperature, and provide fodder in times of scarcity;
- Changes in the policy environment, such as agrarian reform, and social protection measures;

Using the robust decision-making tool (Figure 2), the inventions can be selected that are most feasible and appropriate based on local conditions – both climatic (across the range of certainties) and socioeconomic.

Table 3: Some examples of interventions that contribute to adaptation

Change	Impact	Intervention examples
Temperature increase on land and water	Heat stress on crops	Access to heat tolerant crops
	Increased crop water demand and/or reduced water availability	Access to drought-tolerant and fast maturing crops and varieties
		Increase soil organic content
		Water-conserving crop management practices (e.g. ridge planting)
		Maximize water capture and storage
		Advocacy on securing rights of access to water supplies for small-scale farmers
	Heat stress on livestock	Tree planting (shade and fodder)
		Change to more heat tolerant livestock (e.g. shift from cattle to goats)
	Worsening availability of fish stocks	Conservation of coastal mangroves and other vegetation
		Sustainable aquaculture, such as fish farming in ponds
	Glacial melt flooding	Early warning systems
	Glacial melt reducing summer river water	Maximize water capture and storage
Sea-level rise	Saline intrusion	Provision of water for households and productive use
		Access to saline tolerant crops
	Coastal erosion	Sea defences built
	Increased frequency/severity of storm surges	Early warning systems
		Protected/raised food, water and sanitation
		Mangrove rehabilitation
Changed seasonality	Farmers uncertain about when to cultivate, sow, and harvest	Appropriate, accessible, and reliable seasonal and weather forecasts
		Crop diversification and crop mixing
		Livelihood diversification
	Crops damaged by dry spells within growing season	Appropriate, accessible, and reliable weather forecasts
		Crop diversification and crop mixing
		Water capture and storage
		Access to fast maturing/drought tolerant crops
		Soil and crop management to conserve water
	Crops damaged by unseasonal heavy downpours	Appropriate, accessible and reliable weather forecasts
		Flood-tolerant varieties
		Crop diversification and crop mixing
		Sustainable agricultural techniques to improve drainage
		Crop insurance/social protection measures
	Reduced agricultural seasons	Livelihood diversification
		Access to fast maturing/drought tolerant crops
		Appropriate, accessible, and reliable seasonal and weather forecasts
Increase in intense rainfall or large increase in annual rainfall	Increased frequency/severity of floods	Improved drainage
		Protected/raised food, water and sanitation
Decrease in annual rainfall in arid/semi-arid areas	Increased frequency/severity of drought	Rainwater harvesting
		Community water management committees
		Access to more drought-tolerant crops

Figure 2: Robust decision-making tool for climate change adaptation in rural livelihoods

1 What is the climate context?

- What current climate hazards and emerging trends affect the area?
- What are the impacts of these?
- What are the likely impacts of climate change in the area over the short-, medium- and longer-term?
- What is uncertain?
- What strategies are employed to protect against climate hazards or change in response?

2 What is the local context?

- Are livelihoods climate-sensitive, and in what ways?
- Whose livelihoods are most vulnerable to climate change? What are the climate- and non-climate-related factors?
- What are the available livelihood opportunities, and what are the limiting factors?
- What resources are available? Who has access? How are they managed?
- What information is available? How is it communicated? How is it used?
- How is risk reduced and managed?

3 What interventions and policies are feasible and appropriate to address 1 and 2?

- What interventions and policies would reduce risk from and enable adaptation to address current hazards, variability, and emerging trends?
- What interventions and policies would manage risk and uncertainty?
- What interventions and policies would build adaptive capacity?

4 Which of these, or which combination of these, are most robust, given 1 and 2?

- Considering the level and types of likely changes and uncertainty, which of the options are preferable?
- Considering the local context, which options are needed to build adaptive capacity?

4 Conclusions

Decades of development theory and practice prove that a holistic, people-centred approach is the best path to effective and sustained poverty reduction. The challenges presented by climate change means that it's also the only way to adapt. Elements that are crucial for adaptation are:

1. Investing in communities' ability to shape, create, and respond to change by building adaptive capacity;
2. Empowering (and resourcing) local levels of government to be genuine agents of change for the communities they serve;
3. National planning that is informed by bottom-up vulnerability assessment in order to create an enabling environment for adaptation.

These are all identified elements of effective development that are frequently sidelined, but which adaptation demands be kept front and centre. Adaptation interventions are not necessarily new, but how you arrive at them and the transformational changes they seek to make certainly are. A robust decision-making approach must select interventions that, in combination:

- Address current hazards, increased variability, and emerging trends;
- Manage risk and uncertainty;
- Build adaptive capacity.

Climate change forces a more holistic approach, not only to lift people out of poverty, but also to enable them to manage risk, uncertainty, and change, and to make them agents of their own destiny to shape, create, and respond to changes throughout their lives. Adaptation isn't a choice between reducing general vulnerability and preparing for specific hazards, it is a process of assessing and reassessing conditions and information related to climate change impacts and to the factors that leave people unable to adapt.

To go beyond resilience, which deteriorates as conditions change, to transformational changes in the lives of people living in poverty in a changing climate demands enormous political will and investment. It demands flexibility and learning through every institution, from household to government. It demands an approach that combines bottom-up with top-down processes; local knowledge and scientific knowledge; reducing vulnerability and addressing impacts; specific responses and managing uncertainty; sustainable livelihoods, natural resource management and DRR approaches; change, and learning how to change. Climate change forces us to draw the strands together.

Bibliography

Ahmed, A.U. *et al.* (2009) 'Climate Change, Gender and Vulnerable Groups in Bangladesh', Dhaka: Climate Change Cell, DoE, MoEF, Bangladesh.

Apte, T. (2006) 'A People's Plan for Biodiversity Conservation: Creative Strategies that Work (and Some that Don't)', IIED Gatekeeper Series 130, London: International Institute for Environment and Development

Ashley, C. (2000) 'Applying Livelihood Approaches to Natural Resource Management Initiatives: Experiences in Namibia and Kenya', ODI Sustainable Livelihoods Working Paper 134, London: ODI.

Assey, P. *et al.* (2007) 'Environment at the Heart of Tanzania's Development: Lessons from Tanzania's National Strategy for Growth and Reduction of Poverty (MKUKUTA)', Natural Resource Issues Series No. 6, London: IIED.

Brooks, M. F. Gagnon-Lebrun, H. Harvey, and C. Sauvé (2009) 'Prioritizing Climate Change Risks and Actions on Adaptation: A Review of Selected Institutions, Tools, and Approaches', Policy Research Initiative Sustainable Development Discussion Paper, Ottawa: Policy Research Institute.

Christian Aid (2009) 'Community Answers to Climate Chaos: Getting Climate Justice from the UNFCCC', Christain Aid http://www.christianaid.org.uk/images/community-answers-to-climate-chaos.pdf

Civil Society Position Paper (2009) 'Sustaining Agriculture in the Era of Climate Change in India', Centre for Sustainable Agriculture, India, available at www.fwsci.com/climate-change/Position_paper_-_CSA.doc

Cline, W. (2007) 'Global Warming and Agriculture: Impact Estimates by Country', Washington DC: CGD and Peterson Institute for International Economics.

Convention on Biological Diversity (CBD) (2007) 'Synthesis and Analysis of Obstacles to Implementation of National Biodiversity Strategies and Action Plans: Lessons Learned from the Review, Effectiveness of Policy Instruments and Strategic Priorities for Action' (UNEP/CBD/WG-RI/2/2/Add.1.), UNEP, http://www.cbd.int/doc/meetings/wgri/wgri-02/official/wgri-02-02-add1-en.pdf (last accessed 7 January 2010).

Department for International Development (DFID) (1999) 'Sustainable Livelihoods Guidance Sheets: Framework', London: DFID.

Dercon, S. (2005) 'Risks, poverty and vulnerability in Africa', *Journal of African Economies* 14(4): 483–8.

Ensor, J. and R. Berger (2009) 'Understanding Climate Change Adaptation: Lessons from Community-Based Approaches', Rugby: Practical Action Publishing.

Fraser, A. (2009) 'Harnessing Agriculture for Development', Oxfam International Research Report, Oxford: Oxfam International, http://www.oxfam.org.uk/resources/policy/trade/harnessing-agriculture-for-development.html.

Gbetibouo, G.A. and C. Ringler (2009) 'Mapping South African Farming Sector Vulnerability to Climate Change and Variability: A Subnational Assessment', IFPRI Discussion Paper 00885, International Food Policy Research Institute, http://www.ifpri.org/sites/default/files/publications/ifpridp00885.pdf.

Global Mechanism (2005) 'Report of the Managing Director of the Global Mechanism of the UNCCD to the Seventh Session of the Conference of Parties' http://www.global-mechanism.org/dynamic/documents/document_file/cop7reportpub.pdf

Global Environment Facility (GEF) (2009) 'Progress Report on the Least Developed Country Fund (LDCF) and the Special Climate Change Fund (SCCF)', presented to the LDCF/SCCF Council Meeting, http://www.gefweb.org/interior.aspx?id=25480

Global Network of Civil Society Organisations for Disaster Reduction (2009) **'**Clouds but Little Rain… Views from the Frontline: A Local Perspective of Progress Towards Implementation of the Hyogo Framework for Action', Teddington: Tearfund. Available at: http://www.globalnetwork-dr.org/VFLreports.htm

Gottret, M.A. and D. White (2001) 'Assessing the impact of integrated natural resource management: challenges and experiences', *Conservation Ecology* 5(2): 17 http://www.consecol.org/vol5/iss2/art17/ (last accessed 7 January 2010).

Green, D. (2008) *From Poverty to Power: How Active Citizens and Effective States can Change the World*, Oxford: Oxfam International.

Hassan, R., R. Scholes, and N. Ash (eds.) (2005) *Ecosystems and human well-being: Current states and trends, Volume 1*, Millennium Ecosystems Assessment, Washington: Island Press.

Hedger, M., M. Greeley, and J. Leavy (2008) 'Evaluating climate change: Pro-poor perspectives' in Thomas Tanner and Tom Mitchell (eds.) *Poverty in a Changing Climate*, IDS Bulletin 39(4), Institute of Development Studies, University of Sussex.

Heltberg, R., S.L. Jorgensen, and P.B. Siegel (2008) 'Climate Change, Human Vulnerability, and Social Risk Management', paper prepared for the World Bank Workshop on Social Dimensions of Climate Change, Washington DC: World Bank.

Huairou Commission (2009) 'Women's Views from the Frontline', available at: http://www.huairou.org/

Hurst P., P. Termine, and K. Marille (2005) 'Agricultural Workers and their Contribution to Sustainable Agriculture and Rural Development', Food and Agriculture Organization (FAO), International Labour Organization (ILO), International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations (IUF).

Intergovernmental Panel on Climate Change (IPCC) (2001a) *Climate Change 2001: Impacts, Adaptation and Vulnerability.* Available at: http://www.ipcc.ch

IPCC (2001b) *Climate Change 2001: Synthesis Report.* Available at: http://www.ipcc.ch

IPCC (2007) *Climate Change 2007: Synthesis Report,* available at: http://www.ipcc.ch.

International Fund for Agricultural Development (IFAD) (2005) 'Rural Poverty Reduction: IFAD's Role and Focus', IFAD.

International Institute for Sustainable Development (IISD), International Union for Conservation of Nature and Natural Resources, and Stockholm Environment Institute (SEI) (2003) *Livelihoods and Climate Change: Combining Disaster Risk Reduction, natural resource management and climate change adaptation in a new approach to the reduction og vulnerability and poverty,* Winnipeg: IISD.

International Strategy for Disaster Reduction (ISDR), (2007) 'Hyogo Framework for Action: 2005-2015: Building the Resilience of Nations and Communities to Disasters' http://www.unisdr.org/eng/hfa/docs/HFA-brochure-English.pdf

ISDR (2009) 'Risk and poverty in a changing climate: Invest today for a safer tomorrow', *Global Assessment Report on Disaster Risk Reduction*, Geneva: United Nations.

Jennings, S. and J. Magrath (2009) 'What Happended to the Seasons?', Oxfam GB Research Report, Oxford. Available at: http://www.oxfam.org.uk/resources/policy/climate_change/research-where-are-the-seasons.html

Klemens, R. (2007) 'Desk Study on National Action Programmes (NAP) - Eight Case Studies from Latin America and the Caribbean', Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).

Longley, C. and D. Maxwell (2003) 'Livelihoods, Chronic Conflict and Humanitarian Response: A Review of Current Approaches', ODI Natural Resource Perspectives No 89, London: ODI.

Malla, G. (2008) 'Climate change and its impact on Nepalese Agriculture' in *The Journal of Agriculture and Environment*, Vol: 9, June 2008, pp 62–71. Available at: http://www.nepjol.info/index.php/AEJ/article/viewPDFInterstitial/2119/1952

McGray, H. (2009) 'Adaptation Planning Under a Copenhagen Agreement: Laying a Foundation for the Projects, Policies, and Capacities that Countries Need', WRI Working Paper, Washington DC: World Resources Institute (WRI).

McGray, H., A. Hammill and R. Bradley (2007) *Weathering the Storm: Options for Framing Adaptation and Development*, Washington DC: WRI.

Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-being: Synthesis*., Washington, DC: Island Press.

Mirfenderesk, H. and D. Corkill (2009) 'The need for adaptive strategic planning: sustainable management of risks associated with climate change', *International Journal of Climate Change Strategies and Management* 1(2): 146–59.

Narayan, D., L. Pritchett and S. Kapoor (2009) *Moving out of Poverty: Success From the Bottom Up*, Palgrave Macmillan and the World Bank.

Neumayer, E. and T. Pleumper (2007) 'The gendered nature of natural disasters: The impact of catastrophic events on the gender gap in life expectancy, 1981-2002' in *Annals of the Association of American Geographers* 97(3): 551–66.

Osman-Elasha, B. and T. E. Downing (2007) 'Lessons Learned in Preparing National Adaptation Programmes of Action (NAPAs) in Eastern and Southern Africa', European Capacity Building Initiative http://www.eurocapacity.org/downloads/ecbi_NAPA_PA_Project_2007.pdf (last accessed 7 January 2010).

Osman-Elasha, B., N.G. Elhassan, H. Ahmed, and S. Zakieldin (2005) 'Sustainable Livelihood Approach for Assessing Community Resilience to Climate Change: Case Studies from Sudan', AIACC Working Paper No 17, Assessments of Impacts and Adaptations to Climate Change, http://www.aiaccproject.org/working_papers/working_papers.html

Oxfam GB (2009) 'Oxfam GB Programme Policy Guidelines 02: Adaptation to Climate Change' (internal document).

Oxfam GB (2009) 'Introduction to Climate Change Adaptation: A Learning Companion' (internal document), Oxfam GB Disaster Risk Reduction and Climate Change Adaptation Resources.

Oxfam GB (2009) Disaster Risk Reduction and Climate Change Adaptation Resources: Case Study 'Jasmine Rice in the Weeping Plain: Adapting Rice Farming to Climate Change in Northeast Thailand (Authors: Supaporn Anuchiracheeva and Tul Pinkaew), http://www.oxfam.org.uk/resources/policy/climate_change/climate-change-case-study-thailand.html

Oxfam GB (2008) 'Programme Insights: Policy Research on the Africa Women's Protocol', Oxford: Oxfam, http://www.oxfam.org.uk/resources/learning/gender/programmeinsights_africa_womens_protocol.html.

Oxfam International (2008) 'Climate, Poverty, and Justice: What the Poznań UN climate conference needs to deliver for a fair and effective global climate regime', Oxfam International Briefing Paper. Available at: http://www.oxfam.org/en/policy/climate-poverty-and-justice

Oxfam International (2007) 'Adapting to Climate Change: What's needed in poor countries, and who should pay', Oxfam International Briefing Paper. Available at: http://www.oxfam.org/en/policy/briefingpapers/bp104_climate_change_0705

Oxfam International (2009) 'Even the Himalayas have stopped smiling: Climate change, poverty and adaptation in Nepal', http://www.oxfam.org.uk/resources/policy/climate_change/climate_change_poverty_nepal.html

Oxfam International (2009) 'People-Centered Resilience: Working with vulnerable farmers towards climate change adaptation' Oxfam International Briefing Paper, Available at: http://www.oxfam.org/policy/people-centered-resilience

Oxfam International (2009) 'Beyond Aid', Oxfam International Briefing Paper, http://www.oxfam.org.uk/resources/policy/climate_change/beyond-aid-climate-adaptation.html

Oxfam International (2009) 'Climate Shame: Get Back to the Table: Initial Analysis of the Copenhagen Climate Talks', Oxfam International Briefing Note, Oxfam International: Oxford, http://www.oxfam.org.uk/resources/policy/climate_change/climate-shame-copenhagen-reactive.html

Oxfam International (2009) 'Suffering the Science: Climate Change, Poverty and People', Briefing Paper 130, Oxfam International, http://www.oxfam.org.uk/resources/policy/climate_change/suffering-science-climate-change.html

Parry, M. L., O. F. Canziani, J. P. Palutikof, P. J. van der Linden and C. E. Hanson (eds.) (2007) *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press: Cambridge, UK.

Pisupati, B. (2007) 'Effective Implementation of NBSAPs: Using a Decentralised Approach' http://www.ias.unu.edu/resource_centre/Effective%20Implementation%20of%20NBSAPs%20-%20Pisupati.pdf (last accessed 7 January 2010).

Prowse, M., L. Peskett, and T. Braunholtz (2007) 'Millennium Development Goals, Agriculture and Climate Change', ODI Opinion, London: ODI.

Rawadee, J. and M. Areeya (2008) 'Adaptation strategies for coastal erosion/flooding: A case study of two communities in Bang Khun Thian District, Bangkok', *TDRI Quarterly Review*, March 2008, http://www.tdri.or.th/library/quarterly/text/m08_2.pdf (last accessed 7 January 2010).

Sadik, S. and R. Rahman (2009) 'Indicator Framework for Assessing Livelihood Resilience to Climate Change for Vulnerable Communities Dependent on Sundarban Mangrove System', in *Fourth South Asia Water Research Conference on Interfacing Poverty, Livelihood and Climate Change in Water Resources Development: Lessons in South Asia, Kathmandu, Nepal*: 218–31.

Scoones, I. (1998) 'Sustainable Rural Livelihoods: A Framework for Analysis', IDS Working Paper 72, Brighton: IDS.

Sharma, A (2009) 'Planning to Deliver: Making the Rio Conventions more Effective on the Ground: Climate Change, Biodiversity, Desertification', GTZ.

Sporton, D. and L.C. Stringer (undated draft) 'Defining the UNCCD's Comparative Advantage in Current International Architecture (1) – International Perspective'.

Swiderska, K. (2002) 'Mainstreaming Biodiversity in Development Policy and Planning: A Review of Country Experience', IIED.

Tearfund and Institute of Development Studies (IDS) (2006) 'Overcoming the Barriers: Mainstreaming Climate Change Adaptation in Developing Countries', Tearfund Climate Change Briefing Paper 1, Tearfund.

Tearfund and IDS (2006) 'Adapting to Climate Change: Challenges and Opportunities for the Development Community', Tearfund.

Terry, G. (ed.) *Climate Change and Gender Justice*, Rugby: Practical Action Publishing in association with Oxfam GB.

Twigg, J. (2007) 'Characteristics of a Disaster-Resilient Community: A Guidance Note', DFID. An electronic version of this guidance note can be downloaded from the Benfield UCL Hazard Research Centre website at: http://www.benfieldhrc.org/disaster_studies/projects/communitydrrindicators/community_drr_indicators_index.htm

Ulsrud, K., L. Sygna, and K. O'Brien (2008) 'More than Rain: Identifying Sustainable Pathways for Climate Adaptation and Poverty Reduction', The Development Fund, Norway.

United Nations, (1992) 'Programme of Action from Rio', Agenda 21.

United Nations Development Programme (UNDP) (1994) *Human Development Report 1994* 'New Dimensions of Human Security'. New York: Oxford University Press.

UNDP (2007) *Human Development Report 2007/2008* 'Fighting Climate Change: Human solidarity in a divided world', New York: Pan Macmillan. . Available at: http://hdr.undp.org/en/reports/global/hdr2007-2008/

UNDP and the Bureau for Crisis Prevention and Recovery (BCPR) (2004) 'Reducing Disaster Risk: A Challenge for Development', New York: UNDP/BCPR.

United Nations Framework Convention on Climate Change (UNFCCC) (2004) 'Reporting on Climate Change: User Manual for the Guidelines on National Communications from non-Annex 1 Parties'.

United Nations Institute for Training and Research (UNITAR) (2007) 'Analysis of NAPA Project Profiles', Climate Change Programme, Geneva:UNITAR.

Wilby, R. L. and S. Dessai (2010) 'Robust adaptation to climate change', in *Weather,* (in press).

World Bank (2007) *World Development Report 2008: Agriculture for Development,* , Washington DC: World Bank.

World Resources Institute (WRI) (2009) 'Bellagio Framework for Adaptation Assessment and Prioritization', Working Paper, Washington DC: WRI. Available at: http://www.wri.org/publication/bellagio-framework-for-adaptation-assessment-and-prioritization

World Resources Institute (WRI), (2009) 'The National Adaptive Capacity Framework: Key Institutional Funcation for a Changing Climate', Washington DC: WRI. Available at: http://www.wri.org/project/vulnerability-and-adaptation/nac-framework

Notes

[1] Oxfam uses the United Nations International Strategy for Disaster Reduction (ISDR) definition. ISDR terminology can be found at: http://www.unisdr.org/eng/terminology/terminology-2009-eng.html.

[2] IPCC (2007).

[3] *Ibid.* pp. 30 and 39. IPCC report that this is 'very likely' due to greenhouse gas forcing.

[4] *Ibid.* p. 30.

[5] *Ibid.* pp. 30 and 39.

[6] *Ibid.* pp. 30 and 39. IPCC report that it is 'more likely than not' that human influence has contributed to a global trend towards increases in area affected by drought since the 1970s.

[7] *Ibid.* p. 46.

[8] Risk is often expressed as 'hazard x vulnerability', for example in Green (2008), p. 201.

[9] Neumayer and Pluemper (2007) note that 'vulnerability 'still means different things to different people', though most definitions includes an element of exposure and an element of socio-economic factors, such as the International Federation of Red Cross and Red Crescent Socieities' definition; 'the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards', and ISDR's definition: 'The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.'

[10] IPCC notes that '... climate change impacts will be differently distributed among different regions, generations, age classes, income group, occupations and genders' (IPCC 2001a, p. 680), and that '... the impacts of climate change will fall disproportionately upon developing countries and the poor persons within all countries, and thereby exacerbate inequities in health status and access to adequate food, clean water, and other resources' (IPCC 2001b, p. 77). As such, it identifies populations in Small Island Developing States (SIDS), countries in Africa, mega-deltas (particularly in Asia) and the Polar regions as the most vulnerable to the impacts of climate change because of their combined exposure to climate changes and relative low levels of adaptive capacity. This is further highlighted through the sectors identified as most vulnerable to climate change impacts, namely: water in the dry tropics, agriculture in low latitudes, human health in poor countries, and all activities that depend on climate-sensitive or already stressed ecosystems.

[11] Adapted from ISDR definition http://www.unisdr.org/eng/terminology/terminology-2009-eng.html.

[12] D. Green (2008).

[13] Christain Aid (2009), p. 7.

[14] Ahmed *et al.* (2009) and IPCC (2007). The IPCC concludes that rural women in developing countries are one of the groups most vulnerable to climate change.

[15] Ahmed *et al.* (2009); and Neumayer and Pluemper (2007).

[16] Ahmed *et al.* (2009).

[17] R. Masika (2002), and Denton and Parish (2003), cited in A.U. Ahmed *et al.* (2009).

[18] FAO (undated) 'Gender and food security: Synthesis of regional documents', available at, http://www.fao.org/docrep/x0198e/x0198e02.htm

[19] Existing inequalities and socio-economic factors that influence resource availability and vulnerability to climate change impacts are often refered to as the 'adaptation deficit', or the failure of development to reduce people's vulnerability to existing climate risks.

[20] When this dangerous step is taken, the incidence of female members of households drinking saline water is higher than for men. (Ahmed *et al.*, 2009)

[21] http://unfccc.int/

[22] Article 4.4 of the UNFCCC, states that *'the developed country Parties and other developed Parties included in Annex II shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects'.*

[23] Last updated 1 March 2010, NAPAs available at http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php

[24] Interview with Catherine Pettengell, May 2009.

[25] Parry *et al.*, (2007) p. 452, drawing from N. Brooks, W.N. Adger and P.M. Kelly (2005) 'The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation.' *Global Environmental Change*, 15 (2) 151–63.

[26] See Oxfam International (2009) 'Climate Shame: Get Back to the Table: Initial Analysis of the Copenhagen Climate Talks' for more information on the outcomes of COP 15 in Copenhagen, December 2009.

[27] IPCC (2007) p. 30.

[28] **Scenario:** The scale of global climate change depends on the levels of greenhouse gases that continue to be emitted and how climate systems react to those levels and interact together. Scenarios are necessarily based on assumptions (informed assumptions, but assumptions nonetheless), thus creating uncertainties in each step taken. Scenarios are therefore often used together to offer a range of possibilities, and the level of overlap used as an indicator of what is most likely.

Model: Real life processes, particularly in system science, are complex. To model how something will behave requires complex processes being simplified into a series of elements that can be measured, observed, and tested.

Parameter: Parameter uncertainty can come from two different sources. First, simply a lack of data or parameter knowledge (such as 'normal variability'), and secondly the need to artificially 'flatten' or homogenise data in order to set parameters or measurements.

At the macro level, these uncertainties are less pronounced and the findings converge more. However, brought down to the local level, with so many variables, these uncertainties are more evident. (Mirfenderesk and Corkill, 2009, p. 147.)

[29] McGray *et al.* (2007) p. 18.

[30] *Ibid*. p. 19.

[31] *Ibid.* p. 19.

[32] Malla (2008); Oxfam International (2009) 'Even the Himalayas have stopped smiling: Climate change, poverty and adaptation in Nepal'.

[33] 'For the next two decades a warming of about 0.2°C per decade is projected for a range of SRES emissions scenarios. Even if the concentrations of all GHGs and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected.' 'Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century.' IPCC (2007) p. 45.

[34] Even if anthropogenic GHG emissions ceased today, warming will likely continue over coming decades due to the excess of GHGs already in the atmosphere. Unfortunately global mitigation action at this time seems unlikely to deliver the dramatic reductions in GHG emissions required to prevent dangerous levels of climate change, as such it is the level of political will to take urgent mitigation action that will determine the level of climate change that people will have to adapt to.

[35] J. Pittock (2008), p. 33, cited in R. Wilby and S. Dessai (2010, in press).

[36] The Precautionary Principle can be characterised as the duty to take action to prevent harm when there is reasonable suspicion of harm, even if scientific uncertainty about cause and effect remain. For more detailed analysis, see D. Kriebel, J. Tickner, P. Epstein, J. Lemons, R. Levins, E. L. Loechler, M. Quinn, R. Rudel, T. Schettler, and M. Stoto (2001) 'The Precautionary Principle in Environmental Science' in *Environmental Health Perspectives,* 109 (9), pp 871–6.

[37] Green (2008).

[38] For a more recent formulation, see the Final Report of the UN Commission on Human Security (2003).

[39] Green (2008), p. 204.

[40] *Ibid.*

[41] Currency and exchange rates at time of project.

[42] Ensor and Berger (2009).

[43] Global Network of Civil Society Organisations for Disaster Reduction (2009).

[44] R. Klemens (2007).

[45] Sharma (2009).

[46] *Ibid*.

[47] *Ibid.*, p11–12.

[48] *Ibid*.

[49] Global Network of Civil Society Organisations for Disaster Reduction (2009).

[50] Fraser (2009) p.47.

[51] *Ibid.*

[52] Stern Review 'The Economics of Climate Change', Part V: Policy Responses for Adaptation, cited in Fraser (2009).

[53] IDS and Tearfund (2006) cited in Fraser (2009).

[54] The density of weather watch stations in Africa is eight times lower than that recommended by the World Meteorological Organisation (Stern Review, *op. cit.*).

[55] M. Brooks *et al*. (2009).

[56] Sharma (2009), page 34.

[57] Global Network of Civil Society Organisations for Disaster Reduction (2009).

[58] Huairou Commission (2009).

[59] See pp.26–7 for more information on the Hyogo Framework for Action for Disaster Risk Reduction.

[60] Global Network of Civil Society Organisations for Disaster Reduction (2009), p. 36.

[61] *Ibid.* p. 18 and the Huairou Commission (2009).

[62] *Ibid.* p. 38.

[63] *Ibid.*

[64] See, for example, Practical Action's *Understanding Climate Change Adaptation: Lessons from community-based approaches*, by Jonathan Ensor and Rachel Berger.

[65] 'The rural poor are independent producers whose livelihoods principally depend on agriculture and agriculture-related activities. They are small or landless farmers, herders, small entrepreneurs, fishers and landless agricultural labourers. They are members of indigenous groups, ethnic minorities and scheduled castes. They are those with the least land and water, and with the least control over the assets they do have. They typically have little access to formal financial institutions for capital of any sort. They often have very little access to modern technology and very little preparation for the development and management of modern forms of association. More often than not, they are women and, as such, have special difficulties in accessing key development resources, services and opportunities.

Frequently the rural poor are socially excluded, isolated and marginalized groups on whom those responsible for the development of modern institutions and services have all too often turned their backs. Their lives are characterized by vulnerability and insecurity, which make it difficult for them to take risks that could lead them out of poverty.' IFAD (2005), pp2.

[66] IPCC (2007). These are the most generalized conclusions that can be drawn from the latest IPCC report. The report also provides information about expected impacts under a range of temperature scenarios and over time.

[67] Jennings and Magrath (2009).

[68] Oxfam International (2008) 'Climate, Poverty, and Justice: What the Poznań UN climate conference needs to deliver for a fair and effective global climate regime'.

[69] Oxfam International (2007).

[70] UNDP (2007) pp178–84.

[71] Oxfam International (2009) 'People-Centered Resilience: Working with vulnerable farmers towards climate change adaptation'.

[72] ISDR (2009) p.163.

[73] ISDR (2007).

[74] UNDP/BCPR (2004)

[75] ISDR (2009), p. 9.

[76] Oxfam International (2009) 'The Right to Survive in a Changing Climate', p. 2 – based on CRED data for droughts, extreme temperature events, floods, mass movements (wet), storms, and wildfires, and comparing the average for 1980–9 and 1998–2007. For details of this projection, please see 'Forecasting the numbers of people affected annually by natural disasters up to 2015', available at: http://www.oxfam.org.uk/resources/policy/climate_change/people-affected-by-natural-disasters.html

[77] For details of this projection, please see 'Forecasting the numbers of people affected annually by natural disasters up to 2015', available at: http://www.oxfam.org.uk/resources/policy/climate_change/people-affected-by-natural-disasters.html

[78] ISDR (2009), p. 11.

[79] The definition of DRR by ISDR, which is used by Oxfam, is available at http://www.unisdr.org/eng/terminology/terminology-2009-eng.html

[80] ISDR (2007). For more details about the World Conference on Disasters in Hyogo 2005, and the Hyogo Framework for Action, go to: http://www.unisdr.org/wcdr/

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