

Adapting to climate change:

How local experiences can
shape the debate

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CDM	Clean Development Mechanism
COP	Conference of the Parties
GHG	Green House Gases: Carbon dioxide (CO ₂); Methane (CH ₄); Nitrous oxide (N ₂ O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); Sulphur hexafluoride (SF ₆)
GDP	Gross Domestic Product
GEF	Global Environment Facility
HDI	Human Development Index
IPCC	International Panel on Climate Change
MDGs	United Nations Millennium Development Goals
NAPA	National Adaptation Plan of Action
ODA	Overseas Development Assistance
PRSP	Poverty Reduction Strategy Papers
UNFCCC	United Nations Framework Convention on Climate Change

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This briefing paper is based on eight studies made by local organisations working on adaptation to climate change in different countries of Africa, Asia and South America, and a background paper describing the gender aspects of adaptation.

The cases both describe local adaptation strategies and provide assessment of the policy response and institutional challenges within countries in which they are located. Brief summaries of the studies and groups involved can be found in ANNEX 1. Fuller descriptions can be found at www.bothends.org.

The paper shows that the experiences of local communities and civil society organisations in coping with and adapting to climatic changes provide an important source of knowledge for developing adaptation policies, nationally and internationally. On the basis of these observations and analyses, this report provides policy recommendations to national and international policy makers, experts and donor agencies.

EXECUTIVE SUMMARY

Recognition of the urgency of tackling global warming has greatly increased in recent years – yet most of the debate remains focused around mitigation and ways of reducing greenhouse gas emissions. In many parts of the world the effects of climate change are already being felt, especially by the most vulnerable communities, who are having to adjust their agriculture and water management practices to cope with these changes. This report draws on the experiences of such communities in the developing world and in doing so provides insights into what adaptation to global climate change entails, both at the local level and in terms of institutional and policy change. It also highlights the inherent inequities of the poorest communities having to adapt to problems largely created by developed countries and the lack of an effective framework for redressing this balance.

The paper reviews the adaptation strategies of vulnerable communities in eight different countries and the issues which this raises. Vulnerability to climate change is an additional problem faced by poor communities and has differential impacts on different sections of these communities. For example, climate change will place a greater burden on women, who traditionally are responsible for providing household food, fuel, water and health care needs.

There is an urgent need for national and international economic and other sectoral policies and investment plans to factor in climate change and its impacts: For example, the World Bank estimates that up to a quarter of its portfolio is sensitive to climate change. Such programmes urgently need climate proofing. As they stand at the moment economic, investment policies and development plans are often cause of maladaptation to climate change. This situation needs to change to allow local communities to develop autonomous adaptation. At the same time vulnerable communities need support in bridging the information and funding gaps that impede their present capacities to adapt to climate change and to share successful strategies with others in similar situations. Above all, new mechanisms are needed to channel funding effectively to people that need it most.

1 INTRODUCTION

In 2006, Al Gore's 'An Inconvenient Truth' and the report led by economist Nicholas Stern significantly increased global awareness about the serious impacts of climate change. ■

In February 2007, the Fourth Assessment Report of the International Panel on Climate Change (IPCC), the global think tank on climate change, showed that climate change is occurring at an alarming rate. The Panel concluded that it is very likely that these changes are caused by human activity¹. The Stern Review states that continuing with business as usual carries risks of major disruptions to economic and social activity, on a scale similar to those associated with the great wars².

Politicians, researchers, and activists alike now recognise climate change as the biggest challenge humanity has ever faced. Calls for action are multiplying. During the G8 summit in Germany in June 2007 mitigating climate change was top of the agenda. Airline tycoon Richard Branson announced a \$25 million prize for the first person or group to find a way to remove billions of tonnes of greenhouse gases from the atmosphere.

While the world is waking up to the urgency of cutting greenhouse gas (GHG) emissions, climate change is already happening. Increased flooding, unexpected droughts and heat waves, changing rainfall patterns, and severe cyclones are affecting the lives of millions of people, especially in the poorest countries of the world. Since the poor are most vulnerable they will be hardest hit. Thus climate change threatens to further increase the gap between the rich and the poor. Those who have contributed least to the problem are likely to pay the largest

part of the bill. This is an affront to social equity and justice.

Even if humanity were to cut GHG emissions to zero today, increasing impacts from past emissions would still be felt for the coming twenty years. There is therefore an urgent need to start supporting processes of adaptation: to enable people to cope with the impacts of climate change and to adapt to those changes that can no longer be avoided.

The international community now almost universally recognises the urgency of mitigating against climate change. Yet it is rather slower to recognise the need for adaptation, which has attracted far less attention and runs the risk of being marginalised as a result. There are many technical questions and institutional challenges that need to be properly addressed: What is the best way to adapt? Which groups and sectors are most vulnerable? How can regional or national climatic models be translated and used on the ground for adaptation purposes? What policies should be adopted to support adaptation? How much does adaptation cost? And who is going to pay for all this?

Many people, all around the world, are already facing the impacts of climate change; climate-related disasters and increasing climate variability are forcing people to adapt. Farmers in Bangladesh are growing salt-resistant crops to deal with the growing shortage of freshwater. Highland peoples

in the Andes are planting trees to capture the water released by melting glaciers. Women in Kenya are constructing sand dams to store water in times of drought. The wide variety of adaptation strategies employed on a local level provides promising answers to the many questions that the international community needs to start considering.

This report analyses the current debate on adaptation to climate change from the perspective of local organisations working in the fields of sustainable development and poverty reduction. It draws on eight case examples on adaptation and a background paper on gender and adaptation, in order to provide a series of recommendations to policy makers in developed and developing countries, and to the climate experts engaged in the United Nations Framework Convention on Climate Change (UNFCCC) negotiations. ■

2 ADAPTATION: THE NEGLECTED ASPECT OF CLIMATE CHANGE DISCUSSIONS

2.1

WHAT IS ADAPTATION?

During the past century the global climate warmed by about 0.7°C because of human activities, and is projected to rise by another 1.4 - 5.8°C in the next 100 years. The impacts of climate change are felt not only through gradual changes in temperature and sea level rises but also, and more so, through increased climate variability and extremes, including more

intense floods, droughts, and storms. Increased climatic variability has already had an impact on the economic performance of developing countries. Sectors especially vulnerable to the impacts of climate change include human health, agriculture, forestry, water supply and sanitation, energy, tourism and the environment. These in turn have (and will continue to have) impacts on care work, poverty and incomes.

Water management and the threats of climate change in Central America

Information about climate change in Central America is scarce. However, the available data and analyses indicate that climate change is causing more erratic rainfall and a reduction of total rainfall, as well as a rise in mean temperatures in the Pacific sub-region. This, in turn, will create increased stress on the region's water systems. The ACODAPCHI association has been supporting the rural population of the Guatemalan Chiquimula department in the sensible use of rivers and forests. Small scale irrigation systems have been developed and a local management plan for the Gigante forest is being negotiated. The water stress due to climate change is now threatening the relationships between different water users and the department is on the verge of a new outbreak of social conflicts over water rights. ■

Millions of poor people around the world are at high-risk from the impacts of climate change, particularly those who depend on natural resources for their livelihoods. It is these people who are most affected by climate change.

The challenge of adaptation is much less well understood than that of mitigation. Reliable estimates on the exact

climatic changes to be expected, their impacts and costs are still scarce as are relevant experiences of large scale adaptation. While people all over the world have always adapted to changing conditions in the natural climate this natural climatic variability is being accelerated by human-induced climate change. This means that the changes will take place faster, and people will have less time to adapt. Thus,

adaptation to human induced climate change can not rely solely on existing knowledge and experiences, but will need additional research and will demand higher investments.

In the words of the IPCC adaptation means: "Adjustments in natural and human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities"³. Adaptation measures are ways to reduce the risks and impacts of climate change. Examples include building dams to control flooding, installing early warning systems to predict cyclones or heat waves and using drought-resistant crops to endure droughts.

A distinction can be made between coping (reactive adaptation) and adapting (proactive adaptation). The first is about acting *in response* to observed climatic changes and variability and alleviating the impacts, the latter entails *anticipating* future climate change by reducing the risks or taking advantage of the changes. Actions that exacerbate risks to climate change, such as settlement development in flood-prone areas, and policies that hamper actions toward planned adaptation, are referred to as maladaptations.

Maladaptation

In the Peruvian Andes, climate change is causing the disappearance of one of the main water sources, the high-mountain glaciers. The ensuing changes in the water regime are threatening people's livelihoods in many ways and increasing competition for water. As in many other regions, poor people living in the rural upper watersheds, stand to lose most. In the Ocoña basin, water scarcity may be compounded as a result of mining activities promoted by the Peruvian government. This additional pressure on the basin's land and water resources will increase people's vulnerability and diminish their options for adaptation. ■

Communities in developing countries have spontaneously and autonomously developed strategies to cope with extreme climatic variability. Others have started to consciously design and implement adaptation strategies. However, effectively anticipating and adapting to future climate change requires relevant and tailored information on likely future changes at the local level. In general, such information is not available, accessible to those who need it or lacks sufficient accuracy.

Until now, very few efforts have been made to support communities' autonomous adaptations to changing climatic patterns and the weather extremes that they are giving rise to. There is a clear need for planned adaptation policies, which strengthen the capacities of communities and local organisations, and link local adaptation needs to regional, sectoral and national policy frameworks and decision-making processes. Only by making these more "climate proof" will effective and sustainable adaptation be possible. ■

2.2

INEQUITABLE IMPACTS OF CLIMATE CHANGE

The challenge of adaptation is related to the challenges of equity and responsibility: those most vulnerable to climate change are the ones least responsible for it. Thus, those who are contributing most to GHG emissions have an inherent responsibility to support the urgent adaptation needs in developing countries.

A society's vulnerability to climate variability and climate change reflects its degree of exposure *and* its capacity to adapt. The poorest people in developing countries are the most at risk. Vulnerability is influenced by many factors, including population and income levels. While vulnerability varies from region to region, it is generally highest in developing countries. Their economies often depend on climate sensitive activities such as agriculture, fishing and tourism. In addition, they often lack the institutional, economic and financial capacity to cope with the impacts and invest in risk reduction. To give an example, in high-income countries, insurance covered 40% of weather-related disaster losses from 1980 to 2003 but only 4% in low-income countries⁴. Recent estimates by Wageningen University indicate that the Netherlands needs to invest about € 62 billion by 2020 to adapt to climate change⁵. The World Bank estimates that costs of adaptation in developing countries will amount to 10 to 40 billion US dollars per year⁶.

Not all groups in developing countries are equally affected. The poorest in both rural and urban areas are most vulnerable. Globally, over two-third of the poorest people are female. Climate change will have different impacts on men and women. In extreme events - after sudden climatic events

or long-term disastrous developments - it is often the men who migrate to urban areas in search of work, leaving the women and children behind with a diminished ability to cope. In addition, women's livelihoods are often more dependent on the natural environment. They traditionally are responsible for providing food, drinking water, sanitation, health and general care for the family. The impacts of climate change on the availability of natural resources and agricultural productivity is therefore likely to place additional burdens on women and increase their workload. ■

³IPCC, 2001

⁴PEW, 2006

⁵Het Financieele Dagblad, April 6th 2007

⁶World Bank, Clean Energy and Development, 2006

3

THE INTERNATIONAL FRAMEWORK FOR ADAPTATION

The United Nations Framework Convention on Climate Change (UNFCCC) was agreed upon in 1992. It recognised the serious threat of global warming and focused predominantly on the urgent need for mitigation, i.e. activities to reduce the release of greenhouse gases into the atmosphere⁷. ■

The UNFCCC recognises as a principle that industrialised countries and, to a lesser extent, those with economies in transition (together referred to as 'Annex 1 countries') are historically responsible for most GHG emissions and hold most of the responsibility for climate change. It also recognised that these countries should take the first steps to combat this threat through reducing their greenhouse gas emissions. Despite these recognitions, the UNFCCC did not include specific reduction targets for Annex 1 countries, which were only later addressed in the Kyoto Protocol to the UNFCCC.

The Kyoto Protocol (KP) was adopted in 1997 to implement the obligations established under the UNFCCC. The Protocol focuses mainly on mitigation efforts, and its primary goal is to establish binding reduction commitments, or targets, particularly for Annex 1 countries. These countries committed themselves to reducing their overall emissions of six greenhouse gases to at least 5% below 1990 levels, between 2008 and 2012. These mitigation efforts should be enshrined in national policies and legislation. Under Article 4, developing countries (non-Annex 1 countries) are obliged to prepare a list of anthropogenic emissions and establish mitigation programmes to reduce these.

Adaptation has been part of the UNFCCC from the very beginning. The Framework Convention defines a three-staged approach:

- Step 1: Assess impacts and vulnerabilities.
- Step 2: Develop measures to prepare for adaptation, including capacity building.
- Step 3: Implement adaptation measures.

Article 10b of the Kyoto Protocol calls on all countries to create national programmes to facilitate adequate adaptation to climate change, later termed National Adaptation Plans of Action (NAPAs). These plans should address the energy, transport, industry, agriculture, forestry, waste management and spatial planning activities required to adapt to climate change.

The Convention calls for developed countries to commit themselves to supporting particularly vulnerable countries in meeting the costs of adaptation. However, adaptation still takes a distant second place in the UNFCCC negotiations and policy-making processes and funding for adaptation has been very limited.

The UNFCCC has established funding channels to support developing countries reduce their risks to climatic changes. The Global Environment Facility (GEF) administers the Least Developed Countries Fund and the

Special Climate Change Fund, and has established a Strategic Priority on Climate Change within its regular Trust Fund. Countries such as the Netherlands and the UK have provided bilateral development assistance to adaptation efforts. These financial resources have allowed developing countries to assess their vulnerability, examine adaptation needs and options and prepare NAPAs. In relation to the scale of the problem, however, only very limited amounts of funding have been made available for implementing *in-situ* adaptation measures.

In 2001 the 7th Conference of the Parties (COP) decided to supplement voluntary donor country contributions with a levy of 2% on proceeds from emission credits generated through the Clean Development Mechanism (CDM)⁸ and to channel these to the Protocol's Adaptation Fund. However, the governance of this fund is still being discussed and no funds have yet been channelled to it. In addition, there is considerable uncertainty regarding the future flows from the CDM.

In total, the international financial flows for adaptation amount to a few hundred million dollars a year,⁹ a sum that is grossly insufficient to meet the real costs of adaptation.

In Nairobi, during COP 12, parties agreed on a five-year programme of activities on the scientific, technical and socioeconomic aspects of vulnerability and adaptation, the "Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change", and discussed the management of the Adaptation Fund. A decision on the way forward for adaptation is expected at COP 13 in Bali, Indonesia in December 2007. ■

4

THE ADAPTATION DEBATE: MAIN ISSUES

4.1

ADAPTATION UNDER THE KYOTO PROTOCOL¹⁰

There is some discussion about the viability of extending future adaptation efforts within the Framework Convention, although experts, civil society organisations and policy makers have different opinions about this. Some call for concrete adaptation measures within the current Framework, others for a new Adaptation Protocol. Substantial new commitments to mitigation after 2012 may only be politically feasible if accompanied by stronger support for adaptation¹¹.

However, fitting adaptation into the existing UNFCCC processes may constrain what can be achieved in practice. The UNFCCC was specifically created to address climate change, and has not been able to engage many of the actors whose participation in adaptation is essential. The fact that climate change has traditionally been considered as an environmental issue may hinder the comprehensive effort that is needed to mainstream adaptation.

Despite the importance of the outcomes of the Convention negotiations about adaptation, efforts also need to be made outside the international climate regime to meet the urgent need for developing, implementing and funding adaptation strategies. To be effective, these processes need to be linked to national and sectoral planning and factored into development investments. ■

4.2

KNOWLEDGE BASE

Knowledge about effective adaptation strategies and supporting policies is still limited. Adaptation tends to be location-specific, which makes it difficult to draw general lessons. For example, building higher dykes may work in the Netherlands, but this strategy is unlikely to be feasible in Bangladesh.

Sustainable adaptation needs to focus on building the adaptive capacity of communities, starting with providing support to them now in coping with variability. This is a long-term process and requires long-term institutional support. This support should focus on sharing and strengthening existing knowledge about climate variability, its impacts, and local adaptation strategies. In addition, knowledge-sharing links need to be established between local adaptation needs and actions and policy and investment processes on national and international levels.

At the international level, there has been limited communication and coordination between experts. The potential for communities of experts in climate adaptation, disaster risk reduction and development sharing their knowledge has only recently been recognised. The main challenges in effective coordination and cooperation include differences in conceptual and

⁷The GHG included in Annex A of the Kyoto Protocol are: Carbon dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF₆).

⁸The Clean Development Mechanism (CDM) is an arrangement under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment to invest in emission reducing projects in developing countries as an alternative to, what is generally considered as, more costly emission reductions in their own countries.

⁹Huq, 2007

¹⁰See also: www.ids.ac.uk/ids/pvty/ClimatChange/research.html#post2012; www.basic-project.net/data/SP_prop_rev_nairobi.pdf; www.ids.ac.uk/ids/pvtyclimatechange/mitigationbasic.html; www.cicero.uio.no/media/2776.pdf

¹¹PEW, 2006

technical approaches, and different levels of intervention. New skills and approaches are often required to enhance trans-disciplinary research and effective sharing of knowledge between scientists, development agents and affected communities.

4.3

'CLIMATE PROOFING' POLICIES AND INVESTMENTS

While adaptation measures need to be implemented at the local level, such efforts need to be supported by appropriate national policies and strategies. Much needs to be done to realise sustainable adaptation measures at local and national levels: relevant information needs to be made available to the right people, the capacities of policy makers and community leaders need to be strengthened, financial resources must be committed, and appropriate technologies developed. First and foremost, effective adaptation requires political will.

Climate change poses challenges to social and economic activities. If adaptation is to be sustainable and cost-effective, it needs to become an integral part of relevant national, sectoral and regional policy processes, including economic planning and investment decisions. This implies a significant change from current practice, in which climate change is still treated as an environmental issue, dealt with within national Ministries of Environment.

Mainstreaming adaptation to climate change in policies is also essential in development support and investments by bilateral and multilateral donors, private actors and NGOs. Climate change will have a large adverse impact on sustainable poverty reduction,

and pose a threat to achieving many of the United Nations Millennium Development Goals (MDGs). For example, investments in infrastructure may be negatively affected by extreme weather events, and new irrigation systems may underperform due to a decrease in rainfall. Small-scale income generating activities, in which women play the leading roles, are often the first to be affected by climate change.

Simultaneously, development efforts can have an impact on the adaptive capacity of a country or community. They can give rise to maladaptation, for example by increasing the vulnerability of people by promoting the settlement of flood-prone areas, or by causing ecosystem degradation when building large dams. At the same time, experience has shown that efforts to reduce poverty through integrated development programmes can reduce vulnerability to climate change. Sometimes only minor adjustments are needed to ensure that such activities contribute to adaptive capacity.

Bolivia: the effects of climate change on production chains

There is already compelling evidence of climate change in Bolivia, a country with diverse landscapes and an already vulnerable population. Changes in precipitation patterns and glacier retreat are affecting the hydrological cycle. Rising temperatures are increasing the incidence of forest fires, affecting the growing season and the sensitivity of crops to pests. Climate change is having an adverse effect on the government's programme to promote crops as quinoa, grape and wood for the export market. ■

In other words, it is important to ensure that aid flows are directed at achieving sustainable development *including* an increase of the adaptive capacity to deal with current and future climate change.

One method for integrating adaptation in development cooperation is to carry out a climate risk assessment of current and proposed projects and programmes, in order to evaluate the threats and opportunities arising from climate change and climate variability, and identify how to integrate these into project and policy design. The Dutch Directorate-General for International Cooperation (DGIS) has been experimenting with quick scans assessing the vulnerability of the project portfolios of Dutch Embassies in three countries¹². The scans showed that extra attention needed to be paid to several programmes in the water and agriculture sectors in each of the countries, and recommended a number of short and medium term activities that would achieve this.

The World Bank estimates that about a quarter of its portfolio is subject to a significant degree of climate risk. The study also states that as much as 40% of overseas development assistance (ODA) and international loans are climate-sensitive¹³. The World Bank is currently developing a publicly available screening tool for project developers to assess whether their investments are at risk.

In most countries, progress in mainstreaming climate adaptation has been limited. Many countries have engaged in NAPA processes and carried out climate change projections and impact assessments, but few have started consultation processes to look at concrete adaptation options or identify policy responses¹⁴. In general awareness is still low. The main difficulties include institutional fragmentation and the lack of political will, capacity and resources.

It should be noted that the process of mainstreaming adaptation carries the risk of adaptation being submerged among other competing demands and priorities, and ultimately not getting the specific attention it needs. A dual path, of both mainstreaming adaptation and addressing it in specific programmes, could help reduce this risk. Especially when it comes to funding, it is important to ensure that additional funds are made available outside of the commitments to development funding. ■

4.4

FUNDING FOR ADAPTATION

The Stern Review assesses the cost of mitigation against climate change and compares these with the costs of the impacts under a business as usual scenario. While the report recognises the need for adaptation, it does not include the cost of such measures in its calculations, nor does it provide an estimate of the total costs of adaptation.

Several other studies have suggested that without adaptation, the costs of the impacts of climate change in exposed developing countries could range from several to tens of percentage points of gross domestic product (GDP). Taking only new climate proofing investments into account, the World Bank estimates the cost of adaptation in developing countries to be between 10 and 40 billion US dollars a year¹⁵.

Currently the total international flows of finance for adaptation amount to a few hundred million dollars. Thus, there is a clear shortage of funding for adaptation efforts under the existing Convention. Pledges from donor countries and the 2% levy on CDM credits (see section 3) will not suffice. The funds provided by GEF for adapting to climate change are mainly large sums and thus are not accessible to communities or groups that only have the capacity to use and manage smaller sums of money. One positive development in funding, that goes some way to addressing this shortcoming, is GEF's Strategic Priority for Adaptation which has earmarked \$50 million for testing and piloting adaptation¹⁶ programmes, 10% of which will go towards the Small Grants Programme on Community-Based Adaptation. While this represents some progress in bridging the funding deficit it is by no means adequate to address the scale

¹²NCAP, 2007

¹³World Bank, Managing Climate Risk, 2006

¹⁴Tear fund, 2006

¹⁵World Bank, Clean Energy and Development, 2006

¹⁶See also for the GEF Small Grant Program: <http://sgp.undp.org/>

of the problem, nor is it sufficiently targeted at small community groups, who are likely to be the most effective in addressing these issues.

Other resources for adaptation will come from wise investments in ODA and possibly the development of insurances to help vulnerable countries and communities to cope with and recover from the impacts of climate change. There is currently some discussion about micro-insurance, that aims to protect poor people from such losses. While locally appropriate insurance mechanisms may be useful, insurance at higher levels may be counterproductive and act as a disincentive for climate proofing policies and investments, eventually leading to maladaptation.

Mainstreaming adaptation considerations within development funding programmes support is important, but it is not enough. Financing adaptation to climate change must not be realised at the expense of existing flows earmarked for poverty alleviation. Such funding should be in addition to the 0.7% for ODA, to which major donors are committed.

New funding mechanisms are needed to cover the adaptation costs of those countries that contribute little to climate change, but lack the resources to cope with and adapt to its impacts. The Polluter Pays Principle has to be respected. Part of this approach could involve a higher levy on the emissions market and on international flights, or differentiated funding commitments of UNFCCC Parties. But new additional mechanisms also need to be put in place as the existing mechanisms are insufficient. Somehow, the heaviest polluters should be taxed to pay for the adaptation bill that they are responsible for. ■

4.5

ADDITIONALITY

Even though general estimates about the costs of adaptation have been made, it is still very difficult to establish the exact costs of adaptation, especially at the project or programme level, partly because of the problem of additionality.

The Convention refers to adaptation solely in the context of climate change, implying that support under the Convention can only be directed to activities addressing the human-induced impacts of climate change. It is however difficult, if not impossible, to distinguish between human-induced climate change and climate variability. It is highly problematic to assess which drought is 'normal', and which can be attributed to human-induced climate change, or how much higher a dam should be built to protect people from flooding due to natural climate variability as well as to the unexpected floods due to climate change. This raises difficulties in quantifying the extra costs of integrating adaptation considerations in programme development and raises the question of how to distinguish between integrated natural resource management and adaptation strategies.

It is crucial to address this knowledge gap on additional costs at the global as well as the programme and project levels in order to achieve progress in the negotiations on funding for adaptation.

In this respect the recent experiences of local actors can be of relevance. People in rural and mountainous areas all over the world have been observing changes, and are taking actions to cope with them. In this sense, these are additional actions which illustrate quite clearly what 'additional investment' means. Recognising the value of their observations and actions, and integrating these into the international debate on additionality will help to create a common understanding of the issue. ■

5

ADAPTATION FROM A LOCAL PERSPECTIVE

Men and women all over the world are already adapting to climate change. Their observations, analyses of the problems and coping and adaptation strategies can provide valuable input to national and international policy makers, including those involved in the UNFCCC negotiations and experts in international donor agencies. ■

5.1

ADAPTATION STRATEGIES AND CAPACITIES AT A LOCAL LEVEL

Climate change creates challenges for communities at the local level. These challenges include increased periods of drought or flooding, shifting rainfall patterns, temperature increases and glacial retreat. These can lead to decreased water and fuel availability, increased soil erosion, crop losses, forest fires, higher incidence of diseases and deterioration of road conditions.

Climate change also impacts on human relations: inequities tend to increase, and conflicts between different groups of e.g. water users arise. Women tend to face increased workloads in ensuring sufficient water and firewood is collected and household food security and health needs are met.

People affected by these challenges have started to adapt to them. Some of them are aware that the changes they are experiencing can be attributed to climate change, while others are not, but are still coping, or trying to cope, with changing conditions. Adaptation initially involves coping with current stresses. Adequate

climate information can help people develop awareness of the problems, being able to anticipate future changes in climate change and adapt their livelihood strategies, or indeed adopt new ones.

The cases which this paper draws on show that climate change leads people to focus on reducing their vulnerabilities, and strengthening their adaptive capacity, as well as adapting to the consequences of climate change. Vulnerability is reduced by, for example, constructing water pans to better store water or by tree planting and terracing of slopes to avoid erosion. Ecosystem restoration is an important measure in improving resilience in agriculture and water resources. Often, ecosystem restoration and climate change adaptation are complementary. Communities are diversifying their livelihoods and use alternative crops, such as drought-resistant crops, or alternative sources of fuel. In addition, adaptation activities are often accompanied by changes in institutional relationships that allow local actors to gain more control over their environmental resources. ■

EXAMPLES OF ADAPTATION STRATEGIES DRAWN FROM THE CASE STUDIES:

Water availability and use

- Construction of trenches, water pans or supplemental irrigation systems to retain and store water.
- Implementation of a Payment for Environmental Services (PES) scheme.
- Installation of water meters to better regulate water use, so that tariffs are based on volume consumed and/or allow a base flow to reach the downstream users in times of drought.
- Rehabilitation of boreholes and river banks, small scale irrigation, water harvesting.
- Irrigation using motorised and gravity-fed treadle pumps to increase the productivity of agriculture.
- Reuse of waste drainage from agriculture
- Tapping fallow aquifers and the development of wetlands.

Food security

- Growing drought-resistant, and/or quick maturing crops with better storage characteristics.
- Adoption of organic farming methods, which adapt better to climate change than conventional agriculture systems. Organic farming increases soil organic matter through farm residue recycling and composting. Organic matter improves soil structure and water holding capacity. Extreme high temperatures are prevented by use of mulch, cover crops, and agro-forestry practices.
- Application of organic and inorganic fertilisers in response to reduced soil fertility resulting from land degradation.
- Switching to small livestock, such as goats, that are more resilient to dry conditions.
- Use of drought-resistant seed varieties and small grain crops such as maize seeds and sorghum, millet and sweet potatoes.
- Establishing a community seed bank to supply seeds that have been collected over time in the villages.
- Adopting alternative agricultural technologies, such as plants with shorter growing periods to cope with the shifting winter season (e.g. selected varieties of tomato, cabbage, strawberries and onions).
- Food preservation and drying to provide increased security and variety of food over the winter season.
- Use of bamboo in agricultural systems. Bamboo is the most drought-resistant and fastest growing woody plant on earth. It prevents soil erosion, enriches the soil, provides good charcoal and absorbs pollutants.

- Use of cold frames, simple wooden frame structures with glass panes that act as small-scale greenhouses.
- These structures can provide several degrees of air and soil temperature insulation, and shelter seedlings from cold weather. They allow the community members to plant seedlings earlier in the season and may also provide a permanent home to cold-hardy vegetables, such as greens, for autumn and winter harvests.

Ecosystem rehabilitation

- Tree planting and terracing of slopes to improve slope stability, often using local varieties of fruit and forest trees or trees with specific agro-forestry uses. Tree leaves decompose on the ground to nutrient supply, and leguminous trees fix nitrogen from the air, which enhances nitrogen availability, tree roots open up the soil improving soil structure, and their canopies create micro-climates.
- Natural forest regeneration, combined with soil conservation measures.
- Establishment of vegetative strips to act as buffers and reduce wind and water erosion and re-generate soil fertility.
- Construction of stone packs in erosion gullies.
- Introduction of environmentally friendly agricultural methods that enhance agricultural productivity despite drier conditions.

Health

- Growing *Artemisia annua*: a plant used for the treatment of malaria.

Energy

- Stockpiling fuel, food and clothing for the winter.
- Application of alternative sources of energy: wind, solar, biomass.
- Use of alternative sources of fuel, such as dung.
- Increasing energy efficiency by applying technologies for household insulation and energy efficiency using local materials.
- Increasing the energy efficiency of cooking appliances/stoves and reducing their negative health impacts.

Income

- Diversification of livelihoods into other sectors to generate income.
- Development of systems of Payment for Environmental Services (PES).
- Development of marketing strategies that emphasise the unique characteristics of a specific product in the context of climate change.
- Development of production methods that minimise the additional costs of production due to climate change.

Early warning

- Early warning and evacuation systems for people and livestock, appropriate to the different information channels open to women and men.
- Opening early warning and information centres in community village and towns.

Institutional development/ strengthening

- Strengthening or introducing Water User Associations as the basis for adaptation on a basin level.
- Inclusion of women in decision-making on the management of natural resources.
- Establishing linkages between local, community-based institutions and research institutions.
- Establishing linkages between community-based institutions and government institutions (sectoral and national).
- Commissioning studies of local circumstances and the expected impacts of climate change.
- Development of 'climate proof' basin management plans. ■

Dessai et. al. (2005) has classified the many different forms of adaptation that exist into three main approaches:

- The IPCC approach, focusing on scenarios analysis.
- The risk approach, based on statistical data and probability scenarios.
- The human development approach, determined by the overall development process.

The first two rely on available climate data to build adequate future scenarios and probability models. The third considers climate change as an additional stress factor in societies that are already facing, sometimes extreme, socio-economic development challenges. It focuses on the levels of exposure to climatic hazards and the determinants of adaptive capacity, including the availability of financial resources, access to information, and the existing institutional frameworks.

Creating synergies between local knowledge and scientific knowledge is an important requirement for developing and implementing effective adaptation strategies. Yet, climate data and scenarios are often lacking and all the case studies we draw upon in this report follow the human development approach. For example adaptation in the Chikwawa District in Malawi has been an indirect result of relief work in response to disasters (not induced by climate change). The development of the Payment for Environmental Services scheme (PES) in San Pedro del Norte in Nicaragua has been implemented in reaction to recurrent problems of water shortage. The strategy implemented in Tajikistan combines adaptation with the existing priorities of the community. The one instance where climate data was available was in the Suid Bokkeveld, South Africa, where existing climate change information was tailored to the area covered by a farmers' cooperative. Farmers then set out to record and reflect on longer-term climate change effects

and adaptation strategies and to compare their own experiences with rainfall and temperature forecasts. This led farmers to critically reflect on scientific forecasts and make informed land use decisions. ■

5.1.1

Capacities: What is lacking?

Communities, local NGOs and government agencies often have limited knowledge of climate change issues and appropriate adaptive strategies. Availability of, and access to, information about climate risks and adaptation strategies is poor. Communities need adequate and tailored information, and support in developing the capacity to understand, interpret and act on it. They need access to technical expertise, including specialised meteorological institutions. Tailor-made information can be made accessible through local media, training and capacity building, discussions and shared learning. A particular area of interest is the development of knowledge and analytical approaches to distinguish between the consequences of unsustainable resource management and those of climate change.

Another hindrance to coping with and adapting to climatic changes is the lack of financial resources as there is a shortage of resources for local institutions supporting communities working in this field. Vulnerable households are struggling to meet their basic needs, and often do not have capital to start up new livelihood strategies, nor are they comfortable with taking risks. It is also difficult to find the resources to scale up successfully tested adaptation approaches. The AEDES NHO in Peru have developed and implemented

strategies to 'harvest water', as a direct response to the changes occurring in the hydrological systems of the Andean highlands caused by the disappearance of glacial lakes. AEDES has been looking for funds to replicate this activity in other areas, but without success.

Funding is often tied to very specific sectoral activities. Yet as we argued earlier, the distinction between sustainable natural resource management and adaptation is often unclear. ACICAFOC in Guatemala, for example, have experienced how climate change is increasing the urgency of implementing sound water management systems, yet doing so also involves making existing livelihoods more sustainable and equitable.

Climate change creates new challenges for villagers and local governments alike. The effectiveness of their adaptation strategies will depend on several factors, including strong coordination and systematic negotiation. Community-based organisations may be best positioned to identify the needs and possibilities of adapting to climate change, but local government have established links to the national network of government institutions, and can play a crucial role in coordinating activities on a local, district and national level, and in generating the necessary financial support. Yet, because vulnerable communities rarely participate in local decision-making, local governments are often 'out of touch' with the most pressing issues in their communities.

Local coordination and cooperation are necessary for sustainable development and effective adaptation to climate change. Climate change can be a catalyst in achieving cooperation, but will probably not be the only motivating factor.

The effectiveness of local activities is highly influenced by district and national decisions, investment and development policies. Even policies that at first glance seem to have no relation with climate change may have a negative impact on adaptive capacities. In Peru, engagement in reforestation activities and local peoples' interest in sustainable land and water management are discouraged by the 'assistance' approach of relief agencies who provide food to local people, which changes their relationship to their natural environment and decreases their concern for managing it. Thus, their capacity to manage their environment sustainably and to adapt to the changes in that environment induced by climate change is being diminished by well-intentioned but misguided assistance.

Sometimes the type of support that is being given to communities affected by climate change can produce undesirable effects, as is happening among producers in the high part of Chiquimula in Guatemala where local governmental organisations are subsidising fertiliser costs in an attempt to reverse declining agricultural productivity. This runs the risk of increasing pest levels and crop diseases, as a result of the excessive use of agrochemicals combined with changes in moisture conditions and temperatures. More integrated analysis of the problems is thereby required, in this instance one that adopts a more holistic view of the agricultural unit of production as one with many levels of interactions and not just a simple case of nutrient deficiency. ■

5.1.2

Capacities: What is needed?

There is an urgent need to build the adaptive capacity of vulnerable communities. One potentially useful indicator of adaptive capacity is the Human Development Index (HDI), which includes health, drinking water access, education level and income (PNUD, 2002). Building adaptive capacity is a long-term process that requires long-term institutional support. Awareness raising, providing access to tailor-made, locally relevant climate information from scientific models, and socially and economically appropriate technology transfers will be key elements.

Peer learning is a powerful tool for capacity building. In South Africa the Environmental Monitoring Group (EMG) has been organising quarterly climate change preparedness workshops, and a series of farmer-to-farmer workshops to facilitate farmers in further developing their capacities to apply on-farm strategies to adapt to changing climate conditions. Mount Kenya Organic Farming (MOOF) in Kenya has been implementing farmer open days and providing training for a large number of smallholder farmers who are organised in self-help groups.

Knowledge and data need to be shared between the local population and the scientific community. EMG has developed links with research partners at the Universities of Cape Town and Witwatersrand who were able to offer their expertise and direct access to data and information that would otherwise be unavailable to land users. Moreover, in their capacities as members on government advisory panels, researchers from these universities presented findings and contributions from small-scale farmers that emerged from discussion groups and confer-

ences, thereby creating a direct flow of information between small-scale land users and government decision-makers.

Gender trainings are also required to assure that adaptation measures are developed in a gender-sensitive way and sensitise people to the gender relevance of the work they are doing. Gender experts need to be involved in all stages of programme development to provide those planning and carrying out projects and programmes with information about gender issues and impacts.

The development of local capacities and the implementation of adaptation initiatives require capable local and meso-level institutions. Coordination between such institutions, and the participation of local communities in project design and implementation, are absolutely crucial in creating long-term adaptive capacities.

Donors, development organisations, and government agencies should adopt a coordinated, gender-sensitive approach in which resources are pulled together and focused on prioritised activities that create more sustainable ventures, lessen maladaptation and reduce climate risks at both the national and local levels. A major challenge at the international level is that of developing small-scale funds that are accessible to those working at the local level for investing in improved resistance and resilience to climate-related risks. ■

5.2

LOCAL PERSPECTIVES ON ADDITIONALITY AND FUNDING FOR ADAPTATION

The most vulnerable communities are generally those with the least access to resources and services. For such communities, climate change is only one of a host of factors contributing to their vulnerability, and their scarce resources are stretched among many competing priorities. Addressing vulnerability to climate change requires a holistic approach, which addresses current and future climate challenges as well as the underlying causes of vulnerability. This requires a comprehensive understanding of community vulnerability, a flexible and gender-sensitive approach to development and a long-term commitment to communities. Traditional development mechanisms generally do not provide this flexibility or the time to work with communities.

The local organisations involved in drawing up the cases on which this report is based identified the following key issues in terms of additionality and funding.

- The centrality of research, information gathering, awareness raising, understanding and developing additional activities.
- The importance of changing priorities so that sound environmental management is given particular priority.
- The importance of institutional and capacity building and negotiation processes.
- The importance in changes in production and/or marketing methods and livelihood diversification.

- The relevance of additional actions in terms of environmental rehabilitation/watershed management or the introduction of different types of technology, needed to counteract the impacts of climate change.
- The need for damage repair and reconstruction after climatic events.

Only the last two of these elements are relatively easy to quantify as the case study from San Pedro del Norte, Nicaragua illustrates. Here the additional costs of climatic changes have been identified as including i) increased water costs as a consequence to decreased water availability; ii) decreased food security as a consequence of lower yields during dry years; and iii) infrastructure damage due to extreme precipitation, which reduced future investment capacity and a caused a loss of access to local markets.

The cost of water increases about 30 to 40 fold during droughts, as people and cattle ranchers have to travel much further in search of water. These costs can be prevented, at least partly, by increasing watershed conservation areas, as is currently being done through the Payment for Environmental Services (PES) scheme, and by investing in new infrastructure for water distribution from new sources, usually located farther away.

Reducing the risk of crop losses is probably a bigger challenge. Crop yields are already normally low due to a narrow window of water availability and soil degradation. Increasing crop yields will require investments in soil and water conservation techniques, and improved food crop varieties. New non-cropping agricultural activities are also being considered, such as bee-keeping and medicinal plants, as well as tree planting, which can provide produce for household consumption and for market.

Reducing the risk of damage to infrastructure, particularly roads, from extreme precipitation events, is not an easy task. The size and extent of the damage will largely depend on particular events and the condition of the infrastructure. A financial mechanism (i.e. climate insurance) could be considered to re-build damaged infrastructure, but establishing such a mechanism requires policy changes at the national or international level.

One interesting option for securing additional income for adaptation is the development of innovative marketing of commercial products in climate sensitive areas as in the example of organic rooibos tea in South Africa. In this way environmentally sound land use practices can be combined with value addition and income generation. This will afford industry-players the leverage to negotiate higher prices as incentives for producers to work in an environmentally just manner. "Climate-wise" or "water-wise" (produced in ways that do not contribute to the abstraction of groundwater in excess of the natural capacity for recharge) marketing is likely to win increasing consumer support in the future.

Local communities and local NGOs often experience major difficulties in accessing funds because they cannot quantify the additional costs and benefits of the adaptation measures that they are considering adopting. Their main message is that climate change will place an even greater burden on the scarce resources and capacities of the poor and increase their vulnerability, especially of women. Micro-finance or soft loans can provide seed capital to reverse this trend and build on the adaptive capacity of local communities. ■

5.3

LOCAL PERSPECTIVES ON CLIMATE PROOFING OF POLICIES AND INVESTMENTS

The climate proofing of policies and investments implies:

- Ensuring that policies and investments that limit adaptive capacities and increase vulnerabilities to climate change, i.e. that are examples of maladaptation, are revised.
- Analysing existing policies and investments from the perspective of climate risks, and revise them to reduce climate risks.
- Developing policies and interventions that increase coping capacity, decrease vulnerability and support local adaptation activities. ■

5.3.1

Ensuring that policies and investment that limit adaptive capacities and increase vulnerabilities to climate change, i.e. that are examples of maladaptation, are revised.

In general, this is the most challenging task. National policies and investments are dominated by a drive for economic development, and tend to be characterised by a focus on large-scale interventions and sectoral approaches. Whereas some countries have developed national plans that take climate change and adaptation into account, this has mostly been done within the Ministries of Environment or specially created units and climate change considerations have not been integrated or mainstreamed with other policies.

In South Africa for example, the government is taking climate change seriously, and is addressing it and taking specific measures to integrate climate change in policy and investment processes. However making plans on paper is one thing, but implementing them is quite another. A lack of political will from parliamentarians and low awareness of the importance of addressing climate change amongst most decision-makers contribute to shortcomings in implementation.

In Peru, water users living in the Ocoña basin are becoming increasingly concerned by government support for large-scale mining investment in the upper-catchment areas. Expansion of the mining industry will further increase pressure on the water system, both in terms of water use and pollution. In Nicaragua, national agricultural policies that aim at improving competitiveness in export crops such as coffee and beef. This focus will increase the vulnerability and further marginalise small-scale farmers and farmers growing food crops in fragile ecosystems, such as the hillsides of San Pedro del Norte.

In Kenya there is an opportunity to study the effects and impacts of climate change on economic development within the Economic Development Strategy and Vision 2030 for economic growth. Such an analysis and a quantification of the risks that climate change poses for economic development is important in order to influence policy-makers in different sectors to integrate adaptation into their policies and programmes. ■

5.3.2

Analyse existing policies and investments from the perspective of climate risks, and revise them to reduce climate risks.

Current development plans, such as the Poverty Reduction Strategy Papers (PRSP), national agricultural, transport or infrastructure plans should assess and address the risks caused by current and future climate change. In some cases, reducing risks will entail a change in technological choices. In others, investments might prove to be at too great a risk from climate change and alternative options will have to be developed. In general, agriculture (and by consequence food security) and water resource management are the sectors most vulnerable to climate variability and climate change.

In Nicaragua, the impacts of climate change on various sectors were analysed in the First National Communication to the UNFCCC. However, the conclusions of that study have not been systematically integrated into sectoral and development policies and some sectoral plans do not even mention climate change. Nevertheless, the policy framework provides some openings for adaptation initiatives, particularly in relation to disaster risk reduction and sustainable land use management. The challenge will be to access resources and the capacity to implement appropriate programmes.

The Dutch Directorate-General for International Cooperation (DGIS) has conducted a quick scan of its investment plans in three countries. This indicated that a range of investments were already at risk from climate change. In Bangladesh, a € 53 million programme for providing access to water and sanitation is now revising its choice of technologies and

in Bolivia, the focus on particular crops is being reconsidered¹⁷.

The severity of the potential impacts of climate change can be illustrated by the case of the Bujugali Dam in Uganda. The project depends on the inflow from Lake Victoria, whose water level is rapidly dropping. This fall in water level is partially caused by the mismanagement of the watershed and increased water extraction for irrigation. Regional climate models predict that rainfall in the Lake Victoria Basin may decrease significantly. If this were the case, the effectiveness of the Bujugali Dam will diminish and the building of the dam will cause additional demands on the remaining water in the lake. In a situation of increasing scarcity, this will put further pressure on small-scale subsistence uses of the lake and its water resources.

As far as the case holders could ascertain no risk assessments are being conducted in their countries, and investments continue as planned. ■

5.3.3

Develop policies and interventions that increase coping capacity, decrease vulnerability and support local adaptation activities.

It is important for policy makers to engage in a consultative process and listen to local actors so as to ensure that their priorities and the challenges they face in reducing the risks experienced from climate change are effectively addressed. An enabling framework, with appropriate funding mechanisms and regulations can greatly facilitate local actors in taking appropriate adaptive actions.

In general however there is a disconnection between the local level and the national level in terms of information sharing and decision-making. In Tajikistan, CARE has made efforts to bridge this gap through an Adaptation Advisory Group made up of local and national policy-makers and researchers. However, the perception at the national level remains that climate change is an environmental issue of concern to scientists rather than a development issue of concern to local communities. In addition, the government has limited understanding of the connections between national-level policies and the adaptations that industries, communities, and households need to make. This perception must be overcome if national policies and programmes to facilitate the development of adaptive capacity in vulnerable communities are to be implemented. Improvement of participation in local governance and more resources and capacity for local government agencies are required to ensure that government initiatives are able to support local adaptation.

Other policies to support adaptation include:

- Expediting land redistribution and securing tenure through land ownership amongst previously marginalised groups. These actions are critical in supporting the capacity of small-scale farmers to buffer themselves against the livelihood risks stemming from climate change.
- Promoting organic farming practices that help to increase the quality of the soil and improve the land's water holding capacity. This, in turn, will help decrease vulnerabilities to drought and flooding.
- In addition to measures that promote sustainable resource management, it is also imperative to increase people's coping capacities by putting in place early warning systems, to allow communities to prepare for natural disasters. Likewise, specific programmes for communication and knowledge sharing on climate risks need to be initiated, for example, meteorological information relevant for farmers' decisions on planting dates.

In South Africa, the need for comprehensive policies and supportive legislation is clearly recognised by decision-makers. To its credit, the government has adopted a consultative approach in developing its strategy for climate change. It has involved a wide range of stakeholders in public discussions and debates, and is working proactively, rather than reactively, to predicted climate change scenarios.

Administrative structures should respond to the challenges of climate change, by allowing experts in health, water management or agriculture to include climate change analysis within their normal work and develop concrete activities that can strengthen adaptive capacities. Another possible approach would be to create a climate change department within central government, with strong links with sectoral ministries such as the Ministries

of Health, Agriculture, Livestock and Fisheries. In Kenya, such an arrangement might have helped to control the outbreak of Rift Valley Fever and would significantly speed up the provision of drought-tolerant crops and proper food storage structures to farmers.

Local institutions are often inadequately equipped to support local adaptation initiatives. This can be a result of institutional rules and regulations. In Nicaragua for example, Law No. 466 dictates that 7% of the national Budget should be dedicated to support Municipal Development Plans. However, the allocation criteria only refer to population size of the municipality; territorial size; and the local tax base. Poverty levels, (such as measured by the Human Development Index), and the vulnerability of communities to climate impacts are not considered in this formula.

Institutions with a traditional sectoral remit (e.g. agriculture) are not designed to integrate climate variability or climate change into their procedures. For instance, the Nicaraguan Fund for Social Investment and Emergencies (FISE) invests in water distribution and sanitation infrastructure. To respond to climate change it needs to redirect its focus beyond the hardware of water management and invest in making these systems as climate proof as possible. This will involve adopting ecosystem conservation measures and strengthening local capacities to improve the hydrological functions of the ecosystem. Unfortunately, FISE's mandate is for one-off interventions, and it cannot become involved in initiatives that have recurrent costs, such as the payment for the environmental services scheme in San Pedro del Norte. As such, FISE (and other important institutions) is not geared towards avoiding land degradation and supporting ecosystem restoration, which are key to dealing with the impacts of climate change and climate variability in the drinking water sector.

Meanwhile, non-governmental actors, such as the South African Climate Change Action Network (SACCAN), are proactively addressing capacity development needs. Rolling-out and up-scaling similar projects among land user communities through participatory approaches would greatly contribute to immediate responses to climate change through locally implemented mitigation and adaptation strategies. There is a need for flexible funding programmes and efficient means to access the funds to initiate these kinds of projects. ■

¹⁷See also www.ncapnl.nl

6

CONCLUSIONS AND RECOMMENDATIONS

6.1

LOCAL EXPERIENCES AS THE KEY TO ADAPTATION AT LOCAL AND NATIONAL LEVELS

Autonomous adaptation, carried out by communities and facilitated by local civil society organisations, is already taking place in areas affected by climate change. Farmers, fisherfolk, and water users are analysing the changes that they are experiencing and taking measures to increase their resilience.

Some of these measures are conscious changes in agricultural practices or income-generating activities in order to adapt to climatic changes, others focus on general vulnerability reduction through the wiser use of local natural resources such as land, water and forests.

Local autonomous adaptation is helping poor people adjust to and offset the visible impacts of climate change. Their experiences and the lessons they have learned can provide an important source of knowledge in developing policies and plans for adaptation at the regional, national and international levels.

Supporting and improving existing local adaptation strategies is more effective, less expensive and less demanding on institutional capabilities than large scale and centrally planned adaptation programmes. However, local adaptation initiatives require sup-

port from an enabling policy environment and institutional capacity at local, regional and national levels. Effective planned adaptation therefore should focus on:

- Reducing vulnerability.
- Supporting local adaptation strategies.
- Integrating climate considerations within policies, and
- Additional funding. ■

6.2

VULNERABILITY REDUCTION AS AN ENTRY POINT TO ADAPTATION STRATEGIES

The effects of climate change on vulnerable communities cannot be addressed in isolation. Rather, climate change should be considered as one of a range of factors that contribute to people's vulnerability, one that will place an even greater burden on the scarce resources and capacities of the poor and increase their vulnerability. Adaptation initiatives need to take these other contributing factors into account.

As such, addressing vulnerability to climate change requires a holistic approach, which addresses current and

future climate challenges and the underlying causes of vulnerability. This requires a comprehensive understanding of community vulnerability, a flexible and gender-sensitive approach to development and long-term commitment to the communities concerned. ■

6.3

BUILDING ON LOCAL ADAPTATION STRATEGIES

The following mechanisms all play an essential role in allowing local communities and organisations to continue, improve and spread their work on adaptation.

- *Improved information provision.* Information about climate change and its impacts on local communities is fundamental for successful adaptation. Climate information must be made available at no cost to local communities and in a way that is accessible and understandable to them. It needs to be tailored to the needs of local communities and be channelled through appropriate information channels to reach the most vulnerable. The information must address all different target groups (women, men, youth, elderly, migrants, etc.), and take into account that men and women use different information channels and have different access to information.
- *Building adaptive capacity.* It is important to strengthen the capacity of local people and local policy makers by training them about climate change and adaptation strategies in a way that is linked to poverty eradication and sustainable development, and that pays

attention to the equal participation of different social groups. Women need to be empowered to contribute to this process and to share their knowledge and capabilities. This approach to building adaptive capacity requires long-term commitment to working with these communities.

- *Information sharing.* Action research is an important tool for facilitating information sharing. It enhances the ability of local communities to share their knowledge and make adaptive changes in a rapidly changing environment. Peer learning is also a very powerful tool for knowledge sharing. It is also important to combine local knowledge with knowledge from the scientific community and to enhance trans-disciplinary research and effective coordination between climate scientists, development agents, the disaster risk reduction community and affected communities.
- *Implementing concrete adaptation measures,* such as conservation measures, income diversification, access to credit and loans, and setting up emergency plans. Several local autonomous measures and technologies have already proved to be successful and these need to be replicated and up-scaled. A participatory development process helps to give ownership to those who will carry out and benefit from the measures. Attention needs to be paid to equal participation by different social groups, notably women and men and a gender impact assessment of the measures should be conducted, particularly when the planned measures are implemented from the top down. ■

6.4

INTEGRATING CLIMATE CHANGE IN POLICY FRAMEWORKS

Given the clear links between climate change, adaptation and poverty, there is an urgent need to integrate climate change considerations into national policy frameworks and to include climate risk assessment in current and future investment decisions. People who have been working at a local level in autonomously adapting to climate change can provide important insights of the changes needed to climate proof national policy and investment frameworks, such as Poverty Reduction Strategy Papers (PRSP).

At the same time national and international decision-making processes and funding mechanisms need to become more inclusive and incorporate local actors. They should be recognised as key stakeholders in developing adaptation measures and reducing the climate risks of development policies and investment plans. It is thus important for policy makers to:

- Ensure that policies and investment that limit adaptive capacities and increase vulnerabilities to climate change, i.e. those that are examples of maladaptation, are revised.
- Analyse existing policies and investments from the perspective of climate risk, and revise them to reduce such risk; (i.e., agriculture, water supply, hydroelectricity, etc.).
- Develop policies and interventions that increase coping capacity, decrease vulnerability and support local adaptation activities.
- Engage in a consultative process and listen to local actors to ensure that their priorities and the challenges they face in reducing climate risks are effectively addressed.

- Decentralise power and increase local participation in decision-making (i.e. natural resource management decisions; logging permits, etc.).
- Integrate climate change considerations in planning documents such as Poverty Reduction Strategy Papers (PRSP). This will facilitate the allocation of ODA funds for adaptation activities, and the integration of climate change into development.
- Conduct climate risk screenings for donor policies, programmes and investments. ■

6.5

FUNDING MECHANISMS FOR ADAPTATION

Without additional funding allocated specifically for adaptation, it will be impossible to effectively address the adaptation challenge. We recommend that policy makers and donors:

- Address the knowledge gap on additional costs at global, programme and project level to achieve progress in the negotiations on funding for adaptation.
 - Create flexible, small scale funding opportunities for community based adaptation, action research and pilot or demonstration projects and ensure that funding reaches the most vulnerable.
 - Create micro-finance schemes and soft loans to provide seed capital.
 - Involve vulnerable people in decision-making over the allocation of resources for adaptation.
 - Shift from an emphasis on emergency funding to funding for vulnerability reduction, natural resource management, restoration activities, food security, and early warning systems at the local and national levels.
 - Ensure that funds are equally accessible to women and men, taking into account cultural, societal and religious gender norms.
 - Support national financial mechanisms to implement weather based insurance schemes for rural communities and vulnerable sectors.
 - Create national institutional mechanisms in order to channel funds from the international to the local level.
- Ensure that aid flows for sustainable development take account of the need to increase the capacity of communities and countries to adapt to climate change. At the same time, additional funds, beyond current ODA commitments must be made available.
 - At the international level, there is a need to create a global insurance mechanism to help cover the costs of reconstruction after climate-related disasters.
 - At the international level, there is need to implement concrete and binding targets for the allocation of resources for adaptation in the post-2012 framework. These funds should be allocated through the UNFCCC funds as well as through other mechanisms. ■

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ANNEX 1: SHORT SUMMARY OF THE CASE STUDIES

Community based adaptation to climate variability and change in agriculture and water resources in the dry tropics of Nicaragua. By Carlos Perez, Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Costa Rica.

San Pedro del Norte is a municipality located in the hilly country of northern Nicaragua. Several extreme climate events, such as Hurricane Mitch and various episodes of droughts have caused major socio-economic damage in the municipality. Climate change scenarios suggest that the area will become drier and hotter, increasing the risk of food security and water shortages. The case describes how a local scheme of Payment for Environmental Services has been set up, whereby downstream water users in the municipality pay for restoration activities by the upstream farmers in the micro-watershed. This scheme has resulted in the restoration of the watershed and increased water availability. It proved a successful strategy for increasing peoples' resilience to the threats of climate variability and change.

Quenching the thirst of an arid landscape: adaptation strategies of small-scale rooibos tea farmers in Suid Bokkeveld, South Africa. By Malgas, R.R., Koelle, B.R.I., Oettlé, N.M., Archer, E.R.M., Environmental Monitoring Group (EMG), South Africa.

The Heiveld Cooperative is an organisation of small growers from the Suid Bokkeveld in South Africa who produce cultivated and wild harvested rooibos tea for niche fair trade and organic markets overseas. The small growers organised themselves to improve their livelihoods through better market access and higher prices for their products. The projected increased aridity of the area caused by climate change will have severe impacts on the farmers, greatly reducing the reliability of rain fed crops such as commercially harvested rooibos tea. In response to this farmers have been developing several adaptation strategies, including retaining natural strips of vegetation when clearing lands, constructing wind breaks and adjoining mulched areas and establishing contour bunds to promote infiltration of run-off water and to prevent soil erosion, etc. In addition, quarterly climate change preparedness workshops have been held to facilitate the further development of farmer's capacities to apply on-farm adaptive strategies. These led to the formation of learning partnerships between researchers, land users, and rural development practitioners to allow for further knowledge exchange.

Local adaptation strategies to climate change around Mount Kenya. By Peter Murage, Mount Kenya Organic Farming (MOOF, Africa), Kenya.

Erratic and unreliable rainfall patterns in the biodiversity-rich area of Mount Kenya have left farmers unable to predict the seasons, which they were able to do with precision 20 years ago. This has confused farmers and threatens food security. Temperature increases in the highlands have facilitated the breeding of malaria carrying mosquitoes and the encroachment of pastoralists and elephants in search of greener pastures due to droughts on lower ground has resulted in conflicts with the farmers in the area. MOOF has developed water ponds and a tree nursery, and actively promoted organic agriculture in the communities of Mount Kenya. This type of farming system is better able to adapt to climate change than conventional agriculture. Organic matter improves soil structure and water holding capacity. Extreme high temperatures are controlled by the use of mulch, cover crops, and agro-forestry practices.

Adapting to climate change in the Ocoña River Basin in Arequipa/ Andacucho, Peru. By Manuel Tejada, Asociación Especializada para el Desarrollo Sostenible (AEDES), Peru.

According to the Tyndall Centre, Peru will be one of the three countries hardest hit by climate change, because of the country's high dependence on glaciers as a source of water. Since the 1990s, AEDES has been working with rural communities in the upper watersheds of the Ocoña basin to improve local water management institutions, and to negotiate local needs with central government. The disappearance of the glaciers is having a severe impact on people's livelihoods. Water systems are changing and competition over water resources, such as wetlands is increasing, deepening social inequities. Since 2003, AEDES has made adaptation one of its priority challenges. Since then, the organisation has started raising awareness on climate change amongst the local population, engaged in promoting the participatory development of new agricultural activities and ecosystem restoration and management and has initiated the development of a river basin management plan in which the ecosystem services provided by the inhabitants of the upper basin are compensated for by the urban population living down-stream. AEDES has also supported local groups in contributing to discussions over the 'climate proofing' of government policies.

Local strategies to adapt to climate change in the Chiquimula region of Guatemala. By Varinia Rojas, Asociación Coordinadora Indígena y Campesina de Agroforestería Comunitaria (ACIFAFOC), Central America/ Costa Rica.

Farmer communities in the upland Chiquimula region of Guatemala have been hit by famines twice in recent years, in 2001 and 2003. Traditionally excluded from regional or central support and development programmes, these communities are not prepared for climate change: diminishing water availability will increase existing vulnerabilities. The Association of Agricultural Committees (ACODAPHI) is therefore prioritising sustainable water management and the wise use of water resources. Improvement in water management systems includes developing and implementing small-scale irrigation systems, strengthening the capacities of existing community based organisations, and developing a management plan for the protected Gigante forest area.

Local perspectives and Adaptation to Climate Change in Chikwawa District, Malawi. By Mxolisi Sibanda, Southern Africa Regional Programme Office (WWF SARPO)

The Chikwawa District in southern Malawi is experiencing a large number of impacts from climate change, which particularly affect the life support systems of the poor communities. Seasonal changes, changes in species composition and diversity, changes in precipitation and an increase in extreme climatic events cause disease epidemics and reduced food security. Droughts and floods have severely affected the livelihoods of the people. While the residents of Chikwawa notice the changes, most do not attribute them to climate change, as they are unaware of this global phenomenon. Yet, various adaptive measures are being taken especially directed towards enhancing the agricultural sector through conservation farming, application of organic and inorganic fertilisers and irrigation farming. Also community members have diversified their livelihood into other sectors to generate income.

Adaptation in mountain communities in Tajikistan. By Angie Dazé, CARE International and Firouz Ibrohimov, CARE Tajikistan

Glacial retreat, changing rainfall patterns, droughts, floods, and mudflows in Tajikistan have serious implications for the livelihoods of rural communities. Those communities at higher altitudes are particularly dependent on the natural resource base and therefore highly vulnerable. CARE is working with three mountain communities to implement adaptation strategies on a pilot basis, and helping local government and NGOs to develop their capacity to address the impacts of climate change. Traditional adaptation strategies of the communities have been investigated and built upon. Examples include the use of household cold frames, energy-efficient stoves, food preservation and drying, household insulation, and erosion control. CARE has formed partnerships with the sub-district government units and local NGOs and developed an Adaptation Advisory Group made up of experts in government, research institutions and NGOs.

Local adaptation to climate change in agriculture: experiences from Southern Africa By Charles Nhemachena, Centre for Environmental Economics and Policy (CEEP), University of Pretoria, South Africa

Southern Africa is expected to experience further increases in temperatures and declining rainfall patterns as well as increased frequency of extreme climate events, such as droughts and floods, as a result of climate change. These changes are detrimental to main sources of livelihoods for most poor smallholder farmers, and threaten progress made in attaining the Millennium Development Goals. Adaptations being used by farmers in Southern Africa involve two main modifications in the production systems: 1) diversification and use of drought tolerant crops to reduce the risk of crop failure, and 2) change in crop management, such as modifying the length of the growing period and changing planting and harvesting dates. An important challenge for implementing adaptation programs is to help build and strengthen local cooperation and social institutions within the region.

Gender, climate change and adaptation. Introduction to the gender dimensions. By Ulrike Rohr, LIFE e.V./Genanet, Germany.

This background paper describes why gender is an important factor in climate change debates and particularly in adaptation to climate change. Over two-thirds of the people in the world living in absolute poverty - those expected to be hardest hit by climate change - are women. Women are disproportionately affected by diseases and disasters caused by climate change, both as individuals and in their capacity as caretakers of family members. Climate change will also have major impacts on subsistence agriculture, water availability and health: all areas in which women play an important role. The paper discusses the impacts of climate change on women's lives and provides recommendations on how to effectively mainstream gender dimensions into climate change debates, programmes, measures and financing mechanisms.



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