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The time is NOW

Lessons from farmers adapting to climate change

Acronyms

ADPC	Asian Disaster Preparedness Centre
ASA	Brazilian Semi-Arid Region Alliance
COP	Conference of Parties
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GEF	Global Environment Facility
GM	Genetically Modified
GMO	Genetically Modified Organisms
IGA	Income-generating Activities
IIASA	International Institute of Applied Systems Analysis
IPCC	Intergovernmental Panel on Climate Change
NGO	Non-governmental Organisation
SAWEG	Salima Women's Network on Gender
UNCED	UN Conference on Environment and Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WFP	World Food Programme
WHO	World Health Organization

Cover image: Members of a women's farmers club in Salima, Malawi use a treadle pump to irrigate their community garden.

Photo: Solomon/ActionAid Malawi

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Households processing fodder for future use, Bangladesh

Burning of forests, Brazil

Research team conducting discussion in crop field with farmers, Bangladesh

Photos: Top: Tanjir/ActionAid Bangladesh Middle: Celso Marcatto / ActionAid Brazil Top: Hasan/ActionAid Bangladesh

Members of a women's farmers club in Salima, Malawi, tend to their garden.

Executive summary

Agriculture in the developing world is particularly vulnerable to climate change. The Nobel Prize-winning Intergovernmental Panel on Climate Change (IPCC) says that in some countries in Africa, yields from rain-fed agriculture could be reduced by up to 50 per cent by 2020[1], and in Central and South Asia, crop yields could fall by up to 30 per cent by 2050[2] as a result of climate change. India alone could lose 18 per cent of its rain-fed cereal production.[3]

Seventy per cent of the world's extreme poverty is found in agricultural areas[4] where farmers depend on rain for their harvests – and where too much or too little rain spells disaster. ActionAid's field work confirms that climate-induced declines in crop production are already happening today. In the face of this threat, farmers have begun to respond to failing crops and increased hunger by adopting sustainable, low-input agriculture techniques that increase their food security.

- In Bangladesh, where climate change is having a particularly devastating impact, some farmers are increasing their resilience by changing the way they cultivate their land and by raising the beds of their vegetable plots or modifying their cropping patterns.
- In Brazil's semi-arid region, family farmers are responding to decreases in food production by rethinking how they farm. Among the strategies used to reduce risk are water conservation and crop diversification.
- In Ghana, farmers are combining local and traditional practices with innovation to reduce the risk of losing their harvest to natural hazards. They practice mixed cropping and sow varieties of vegetables that are adapted to their local environment to increase the chance that at least one crop will survive.
- In Malawi, in response to ever worsening harvests and increased food insecurity in their communities, rural women have mobilised to form women's farmers clubs. They pool resources, tools, seeds, and knowledge about agricultural practices so they can respond collectively to decreases in food production.
- In Vietnam, where floods, storms and typhoons are recurrent phenomena, flood and storm prevention committees have been established. These committees play a major role in disseminating information on flood prevention and educating communities on agricultural practices that reduce risks from natural hazards.

These approaches show that sustainable, climate-resilient agriculture is the only way to respond successfully to both the climate and hunger challenges. Most of the activities described in this paper are not 'new' contributions to the challenge of agricultural development. But what makes them innovative is the way they are being used to deliberately respond to the impacts of climate change that are being felt today.[5]

Support for sustainable, climate-resilient agriculture is key to enabling farmers to increase food security and adapt to climate change. This approach is backed by the findings of the recently published International Assessment of Agricultural Knowledge, Science, and Technology for Development (IAASTD), which proposes a reorientation of agricultural investment away from the large-scale agro-industrial model towards an agro-ecological approach that focuses on organic, small-scale and locally produced food.

Yet to avoid the devastating decreases in food production projected by the IPCC, community responses to climate change require a substantial injection of new money.

Now is the time for policy-makers to respond to these challenges. Countries that are party to the United Nations Framework Convention on Climate Change (UNFCCC)[6] are currently negotiating the second commitment period of the Kyoto Protocol (referred to here as the post-2012 agreement). This process began at the 2007 13th Conference of Parties (COP-13) in Bali, and will culminate at the December 2009 Conference of Parties (COP-15) in Copenhagen. The 14th Conference of Parties, in December 2008 in Poznan, is a key opportunity to accelerate the negotiation process and for countries to begin to put flesh on the bones of a new global deal and make concrete commitments to fund adaptation projects and programmes in the developing world.

The strategies highlighted in this report provide concrete examples of the types of adaptation activities that should receive funding.

ActionAid's recommendations for countries in the United Nations Framework Convention on Climate Change (UNFCCC) negotiations

1. The post-2012 agreement must provide substantial new and additional resources for climate change adaptation.
2. The post-2012 agreement must recognise agriculture as a sector that is particularly vulnerable to climate change, and provide funding for adaptation strategies based on sustainable agricultural techniques that allow communities to combat hunger and realise their right to food.
3. The post-2012 agreement must ensure the effective participation of poor and excluded communities in the governance of adaptation funding.
4. The post- 2012 agreement must support women's efforts to claim their rights.

ActionAid's recommendations for National Climate Adaptation Strategies

1. Adaptation strategies for climate change should be incorporated into all national policies and programmes related to food and agriculture.
2. Structural changes should be made in the design and implementation of adaptation programmes at country level to ensure adequate focus on food security and to increase the resilience of small-holder and urban farmers by enhancing their capacity to practice sustainable agriculture and by developing safety nets for climate risk management.
3. Public spending on agriculture should be increased and reoriented to improve agricultural infrastructure, availability of subsidised inputs and access to agricultural extension services for small-holder farmers.
4. The role of local authorities, civil society and community groups in developing, implementing and monitoring adaptation measures should be strengthened.

Poran Ali, Bangladesh

1. Introduction

The Nobel Prize-winning Intergovernmental Panel on Climate Change (IPCC) identifies agriculture as a sector that is particularly vulnerable to climate change: in some countries in Africa, yields from rain-fed agriculture could be reduced by up to 50 per cent by 2020[7]; and in Central and South Asia, crop yields could fall by up to 30 per cent by 2050.[8] India alone could lose 18 per cent of its rain-fed cereal production because of climate change. This decrease in food production and food availability represents a fundamental threat to the capacity of affected communities to exercise their right to food (see Box 1 on page 6).

Since women in the developing world are largely responsible for food production and food provision, the impact of climate change on agriculture also means that women (who already constitute the majority of poor people) are most adversely affected. Women depend more than men on the ecosystems that are threatened by climate change, but they lack access to and control over natural resources, technologies and credit. ActionAid's field work shows that, as a result, women are more vulnerable than men to seasonal and episodic weather phenomena and to natural disasters resulting from climate change.[9]

The developing world will see drastic decreases in food production as a result of climate change, and ActionAid's field work finds that decreases in food production are already occurring. But governments and communities in the developing world lack the finances and the capacity necessary to deal with this impending crisis.

The United Nations Framework Convention on Climate Change (UNFCCC) commits developed countries to support the costs of adaptation for the developing countries that are particularly vulnerable to the adverse effects of climate change.[10] And while no precise figures exist for the cost of adaptation, various estimates suggest the dramatic scale of funds needed. The World Bank estimates that it will cost US $10-$40 billion annually to climate-proof their existing investments in developing countries.[11] The UNFCCC estimates that up to US $67 billion is needed annually by 2030,[12] while the United Nations Development Programme (UNDP) estimates that adaptation could cost up to US $86 billion a year by 2015.[13] While these amounts of money are enormous, US $86 billion represents only 0.2% of developed country Gross Domestic Product (GDP), or about one-tenth of what they currently allocate to military expenditure.[14]

2009 may represent the last, best chance for a comprehensive global commitment to climate adaptation. Countries that are party to the United Nations Framework Convention on Climate Change (UNFCCC) are currently negotiating the second commitment period of the Kyoto Protocol (referred to here as the post-2012 agreement). This process began at the 13th Conference of Parties (COP-13) in Bali, Indonesia, and will likely end at the December 2009 Conference of Parties (COP-15) in Copenhagen. The 14th Conference of Parties, in December 2008 in Poznan, is a key opportunity to accelerate the negotiation process and for countries to begin to put flesh on the bones of a new global deal and make concrete commitments to fund adaptation projects and programmes in the developing world.

Much of the debate around adaptation in the UN negotiations has revolved around how to generate new resources and the mechanisms through which adaptation funding should flow. In the run-up to the Bali COP, ActionAid laid out a set of principles to govern the design of a multilateral adaptation fund.[15] In this paper, however, ActionAid goes a step further to examine the impacts of climate change on food production and the right to food in Bangladesh, Brazil, Ghana, Malawi and Vietnam. It examines community adaptation strategies that are already being used to address food insecurity and draws on the case studies to recommend interventions necessary to deal with the impacts on food production.

Through the case studies presented in this report ActionAid has found that the impacts of climate change are so severe, and resources so scarce, that some communities are forced merely to cope with the impacts. But we have also found evidence of community efforts to adapt to climate change that build resilience and manage the risks associated with climate change. They show that communities and social movements must be brought into deliberations on national and international policies to confront the impacts of climate change

ActionAid believes that the strategies highlighted in this report provide concrete examples of effective adaptation activities that should be funded through the UNFCCC. A comprehensive approach to adaptation will also require attention to issues such as water and natural resource management that are relevant to, but beyond the scope of, this report. Yet even as other elements of the adaptation puzzle are assembled, ActionAid's engagement with community partners convinces us that support to sustainable, resilient agriculture will be a crucial component. To build that case, this report will:

1. Discuss the impacts of climate change on agriculture and the right to food;
2. Describe sustainable agriculture as a means to increase food security;
3. Articulate five principles that are fundamental to the role of sustainable agriculture in addressing climate change;
4. Present case studies from five countries to emphasise how poor people, particularly small-holder farmers and women, are already affected by climate change and how they are beginning to adapt; and
5. Offer key recommendations for how to improve climate-threatened food security through international negotiations and national adaptation strategies.

Box 1: Food as a human right

A rights-based approach to food affirms that all people have the right to adequate food and to be free from hunger. The right to food is firmly established in international law, including the 1948 Universal Declaration of Human Rights (Article 25.1), the 1966 International Covenant on Economic, Social and Cultural Rights (Article 11.1 and 2) and the 1989 Convention on the Rights of the Child (Article 24.1). According to the United Nations Economic and Social Council (General Comment 12), the right to adequate food is realised "when every man, woman and child, alone or in community with others, have physical and economic access at all times to adequate food or means for its procurement."

The right to food also focuses on poor and vulnerable people who are often excluded from the processes that determine policies to promote food security and the need for inclusive societies free from discrimination by the State in meeting their obligations to promote and respect human rights. In this approach, people hold their governments accountable and are participants in the process of human development, rather than passive recipients. A human rights-based approach requires not only addressing the final outcome of abolishing hunger, but also proposing ways and tools by which that goal is achieved. *(Committee on World Food Security 127/10 Sup. 1)*

At the 1996 World Food Summit, 187 heads of state and government reaffirmed "the right of everyone to have access to safe and nutritious food, consistent with the right to adequate food and the fundamental right of everyone to be free from hunger." In June 2002, at the World Food Plus Five Summit, heads of state and government invited the Food and Agriculture Organization of the United Nations (FAO) Council to establish an Intergovernmental Working Group to develop a set of voluntary guidelines to support Member States' efforts to achieve the progressive realisation of the right to adequate food in the context of national food security.[16]

The Intergovernmental Working Group was established in November 2002. After two years of negotiations and discussions with civil society participation, the Voluntary Guidelines were adopted by the FAO Council in November 2004. The Voluntary Guidelines represent the first attempt by governments to interpret an economic, social and cultural right and to recommend actions to be undertaken for its realisation.

It is important to note that Guideline 8 clearly mentions that states should consider specific national policies, legal instruments and supporting mechanisms to protect ecological sustainability and the carrying capacity of ecosystems to ensure the possibility for increased, sustainable food production for present and future generations, prevent water pollution, protect the fertility of the soil, and promote the sustainable management of fisheries and forestry.[17]

2. Climate change, agriculture and the right to food

Although projections suggest that climate impacts will vary geographically, analyses by the Food and Agriculture Organization of the United Nations (FAO) and the International Institute of Applied Systems Analysis (IIASA) have attempted to pinpoint likely regional impacts of climate change on agricultural productivity and on food security. Their work suggests that, on balance, developing countries will lose out due to an increase in arid areas in coming decades:

> *"The FAO/IIASA study indicates that the developing world would experience an 11% decrease in cultivable rain-fed land, with consequent decline in cereal production. Sixty-five developing countries, representing more than half the developing world's total population in 1995, will lose about 280 million tons of potential cereal production as a result of climate change. This loss, valued at an average of US $200 per ton, totals US $56 billion, equivalent to some 16% of the agricultural gross domestic product of these countries in 1995. Some 29 African countries face an aggregate loss of around 35 million tons in potential cereal production.*
>
> *In the case of Asia, the impact of climate change is mixed: India loses 125 million tons, equivalent to 18% of its rain-fed cereal production; China's rain-fed cereal production potential of 360 million tons, on the other hand, increases by 15%.*
>
> *Among the cereals, wheat production potential in the sub-tropics is expected to be the worst affected, with significant declines anticipated in Africa, South Asia, and Latin America."*[18]

ActionAid's field work reveals that decreases in crop production are happening already. And to add to the stress of decreasing yields, poor people have been doubly hit by the recent volatility in food prices. Food prices have been rising since 2000, reaching a peak in 2008. This increase is linked to many factors, including rising oil prices (which make fertilizer and transportation costs higher), competing demand for foodstocks based on competition from biofuels expansion, speculation in commodities markets, failed agricultural development policies, and the incipient impacts of climate change.[19] By early 2008, rice and wheat prices had skyrocketed (60 per cent and 89 per cent increases respectively) compared with levels in 2007. While commodity prices began to decline in late 2008, many of the factors that led to high prices are still in place. Food price volatility, which could be compounded by increasing climate variability, will likely continue to be a serious problem for the foreseeable future.

Poor people in developing countries already spend approximately 50–80 per cent of their income on food.[20] The food price increases undermine their ability to buy food, with significant implications for food security and nutrition levels. ActionAid field work confirms that many people who used to eat two meals a day are now eating only once a day or only every other day.

High prices for staple crops should ultimately benefit all producers. However, small-scale farmers face steep barriers to increasing their production because of decades of failed donor-driven agricultural policies, which have dismantled the structures that gave small farmers access to credit, inputs and technical assistance.[21] Market distortions such as high concentration ratios in food also mean that the potential benefits of higher prices do not necessarily reach farmers. Women are even less likely to benefit from price rises because of gender discrimination in access to and control over land, technologies and credit. In summary, price volatility in global food markets already constitutes a serious threat to the right of poor and excluded people to healthy and nutritious food. That threat will only grow as the impact of climate change on rain-fed agriculture increases.

A soya field in Brazil

3. Sustainable agriculture and food production in a changing climate

The climate crisis has created an opportunity for manufacturers, corporate scientists and foundations to promote 'high-tech' solutions to combat global hunger. These solutions include increased use of fertilizers, chemicals, and Genetically Modified Organisms (GMOs). In fact, the world's largest agricultural biotechnology companies have flooded patent offices with applications for 'climate-ready' genes. The companies, including seed-giant Monsanto and chemical-giant BASF, claim that their genetically engineered climate-resistant seeds can withstand such impacts of global warming as floods, drought, heat, cold and salinity.[22] The US government, including the United States Agency for International Development (USAID), is leading the push for countries to introduce Genetically Modified (GM) crops in their farming. USAID has delivered millions of tons of GM food aid to developing countries and has financed GM research.[23]

Yet analysis by NGOs undercuts the claims of the biotechnology companies. Some evidence indicates that yields from GM crop varieties are actually lower than conventional crops. Moreover, in the few developing countries where GM has been introduced so far, the use of pesticides has increased, soil fertility has been reduced, soil erosion has increased, and land ownership has become more unequal.[24] Poor farmers' traditional practice of seed saving is threatened as farmers are required to sign 'use agreements' with GM seed suppliers. This in turn makes farmers more vulnerable to debt and exogenous shocks as they become more dependent on expensive external inputs.[25]

It is also important to note that any benefit from the GM model of agriculture often bypasses small farmers. Less than one per cent of all GM research is targeted at

small-scale producers; the rest is devoted to crops that large-scale commercial farms grow in monocultures, often with destructive effects on local communities and the environment.[26] Additionally, it must be noted that industrial agriculture is a major contributor to climate change, generating approximately one-third of the emissions that contribute to global warming.[27] A significant portion of the greenhouse gas emissions created by industrial agriculture are generated by agricultural pesticides and chemicals, deforestation and the burning of biomass.[28]

Because of the negative environmental and social impacts of the agro-industrial approach to food production, climate adaptation funding must not strengthen an approach based on genetically modified, high-yield herbicide-resistant seeds, chemical fertilizers, pesticides and mono-cropping. Agricultural development models and adaptation strategies should instead invest in sustainable agriculture, which uses low-input and low-carbon methods, promotes soil and water conservation, preserves biodiversity and avoids contamination of soil and water. This approach has recently gained legitimacy within mainstream institutions as a means to realise the right to food and alleviate poverty. It is supported by the findings of the April 2008 International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD). The assessment included the participation of the World Bank, numerous other UN agencies, multinational companies and more than 400 scientists.[29] It calls for a fundamental reorientation of agricultural science and technology away from a large-scale agro-industrial model towards an agro-ecological approach that focuses on organic, small-scale and locally produced food.[30]

The assessment states that, "a powerful tool for meeting development and sustainability goals resides in empowering farmers to innovatively manage soils, water, biological resources, pests, disease vectors, genetic diversity, and conserve natural resources in a culturally appropriate manner."[31] Moreover, a recent report by the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Environment Programme (UNEP) finds that:

> *"organic agriculture can increase agricultural productivity and can raise incomes with low-cost, locally available and appropriate technologies, without causing environmental damage. Furthermore, evidence shows that organic agriculture can build up natural resources, strengthen communities, and improve human capacity, thus improving food security by addressing many different causal factors simultaneously."*[32]

The report goes on to say that organic and near-organic agricultural methods and technologies are ideally suited for many poor small-holder farmers in Africa, as they require minimal or no external inputs, use locally and naturally available materials to produce high-quality products, and encourage an approach to farming that is more resistant to stress.[33]

In accordance with these expert findings, ActionAid believes that a reorientation of agricultural development and climate adaptation strategies toward the sustainable agriculture approach is essential to the realisation of the right to food (see Box 2 on page 10). Drawing on ActionAid's analysis of the sustainable agriculture approach and the field work detailed in this report, the following principles have emerged as fundamental aspects of sustainable agriculture that help address the challenges posed by a changing climate:

1. Sustainable agriculture increases farmers' capacity to cope with flooding through improved soil management;
2. Sustainable agriculture reduces risk by encouraging farmers to respond to changing conditions through water conservation and crop diversification;
3. Sustainable agriculture blends learning from farmers' traditional and local experience with scientific knowledge and innovations;
4. Sustainable agriculture approaches support the empowerment, organisation and mobilisation of rural women and other vulnerable groups to ensure access to and control over natural and productive resources;
5. Sustainable agriculture approaches empower communities to take collective action to reduce their vulnerability and claim their right to food.

Box 2: The sustainable agriculture approach[34]

While the implementation of sustainable agriculture approach should be flexible according to each specific context, the approach strives to promote:

1. Equitable access to and control over natural resources such as land, seeds, water and forests.
2. The use of seed varieties adapted to local conditions that farmers can improve, breed and freely save and exchange. Furthermore, the approach should prioritise participatory improvement and breeding of local seed varieties and 'in situ' public research.
3. The use of affordable and appropriate technologies that increase farmers' resilience to climate change.
4. Women's access to and control over resources in the production, processing and distribution chain.
5. Forms of production based on agro-ecology and organic sources of nutrients, multiple cropping, soil and water conservation, integrated pest management, agro-forestry and crop rotation for food production.
6. Integrated cropping and livestock production systems that respond to nutritional needs of the communities and that fundamentally ensure food security at all levels.
7. Farmers' resilience to cope with external shocks, including natural disasters and disruption of input markets by conflict, climate change, price fluctuations and other factors.
8. Farming systems that are not dependent on the continued use of agro-chemicals by progressively eliminating the use of synthetically compounded fertilizers, chemical pesticides, animal growth regulators and livestock feed additives.
9. The reduction of waste, pollutants and the avoidance of burning.
10. Strengthening of farmers' traditional and scientific knowledge and innovation, farmer-to-farmer exchanges and dialogue with public research centres and academia.
11. The use of appropriate mechanical cultivation, bio-pesticides and bio-control agents.
12. The development of local post-harvesting technologies, especially agro-processing technologies that guarantee value addition and food availability throughout the year.
13. The organisation and mobilisation of small-holder farmers and other rural people to make states accountable to implement agricultural policies that provide affordable credit, rural extension and research services in addition to insurance, marketing mechanisms, price and income support and a living wage.
14. The empowerment, organisation and mobilisation of rural women to hold states accountable to implement policies that ensure women's access to and control over natural and productive resources.
15. The empowerment of farmers and other people to associate themselves in order to strengthen their bargaining power and claim their right to food.
16. Associations (co-operatives) of small-holder farmers that facilitate economies of scale, better access to markets and greater bargaining power.
17. Strong market linkages within communities and between rural and urban areas.
18. Information management systems that allow farmers to plan their production, agro-processing, commercialisation and marketing.

The following section will explore how climate change is affecting agriculture and undermining the right to food of poor people in Bangladesh, Brazil, Ghana, Malawi and Vietnam. It will also illustrate how farmers from these countries are taking action to adapt to climate change and are applying the principles of sustainable agriculture in order to increase their resiliency and to reduce their vulnerability.

Farmers showing drought affected fleld to research team, Bangladesh

Household level adaptation strategy of raising plingth, Bangladesh

Women in discussion with research team, Bangladesh

Hungry children waiting for parent to come with food, Bangladesh

4. Case Studies

While there is still a need for more scientific data on the impacts of climate change on agriculture and food production, the testimonies of poor people – who live every day with the effects of climate change – provide powerful evidence of climate trends, impacts and strategies to build resilience to climate change.

The following cases are based on field research conducted in five countries where ActionAid works with community partners. Each case highlights the efforts made by poor people to adapt to the changing climate by embracing aspects of the sustainable agriculture approach. Each also demonstrates a key aspect of the approach as an effective response to climate change, among the multiple adaptation strategies employed by communities. The studies also underscore that, in spite of national and global discourses on the importance of adaptation to climate change, measures taken by governments and donors to date are not reaching the most vulnerable groups. In many countries, small-holder farmers, and women in particular, are seeing their right to food undermined by a lack of support for efforts to improve their capacity to adapt to the changing conditions in which they produce and access food.

Photos: Hasan/ActionAid Bangladesh

Soil-less agriculture in south west Bangladesh

Bangladesh: Increasing farmers' resilience through improved soil management

With a population of about 140 million living in an area covering 144,000 km^2, Bangladesh is one of the most densely populated countries in the world.[35] More than 75 per cent of its people live in rural areas and agriculture represented 19.61 per cent of the country's GDP in 2006.[36]

Located between the Himalayan mountains and the Bay of Bengal, Bangladesh is highly vulnerable to climate change and its impacts. Ice and snow melting from the mountain tops often combine with rainfalls and draining water from neighbouring countries to swell the numerous rivers of Bangladesh, causing floods that sometimes last for several months. Seasonal droughts in the northwestern region of Bangladesh are also intensifying. Such hazards have a significant effect on agricultural production, livestock population, employment and health. Under such circumstances, the right to food is seriously undermined by worsening climate conditions.

Impact of climate change

People living near the rivers of Bangladesh and the Bay of Bengal are used to floods. In the past, yearly floods even contributed to agriculture by bringing moisture and nutrients to the soil. Nowadays, however, the intensity and severity of floods has sharply increased.

Most climate models predict that 17 per cent of the total area of Bangladesh along the coastal belt may be under water by the end of the twenty-first century due to rising sea levels. This will increase salinity intrusion, which is already having a negative effect on soil fertility. Seasonal droughts in the northwestern region of Bangladesh are also causing serious damages to crops and food shortages. Extreme weather events put a huge strain on the country's economy, infrastructure and social systems. They bring with them loss of lives, destruction of houses and public buildings, disruption of education and loss of assets and livelihoods. Their intensification will have a disastrous effect on poor people.

While disasters and food insecurity induced by climate change affect both women and men in Bangladesh, the burden of coping with disasters falls heavily on women's shoulders. The division of labour between men and women becomes critical, as disasters bring additional work and changes in environment that often reinforce and even intensify gender inequity. Because women are culturally perceived as having a lower social status, they suffer more than men from poverty, hunger, malnutrition, economic crises, environmental degradation, health-related problems and insecurity. ActionAid's field work shows that women are often forced to sell their assets, such as hens, chickens or goats, in order to feed their families, and when food support is insufficient to feed all family members, women are generally the ones who do not eat.

Climate change and the right to food

Climatic events such as changes in rainfall patterns, floods, storms, river bank erosion, salinity intrusion and drought have exacerbated the problems faced by Bangladesh's agricultural sector and increased the risks of food shortages. Cyclones also prevent fishermen from going to the coast or the rivers to bring back fish or crabs. Researchers from the Asian Disaster Preparedness Centre (ADPC) and the FAO have pointed out that agriculture in Bangladesh "is already under pressure from increasing demands for food and the parallel problems of depletion of agricultural land and water resources from overuse and contamination. Climate variability and projected global climate change makes the issue particularly urgent."[37]

The associated decline in crop production, losses of assets and lower employment opportunities contribute to increased household food insecurity. Food consumption falls, along with the ability of households to meet their nutritional needs on a sustainable basis. Vegetables and

Photo: Mokit/ActionAid Bangladesh

roots are in short supply during natural hazards. Acute shortage of pure drinking water makes the situation even more critical, as most women from rural areas have to carry water over long distances.

Climate change and its impacts on the right to food in Bangladesh raise serious questions about poor people's capacity to sustain their food security. The uneven distribution of resources within the country is exacerbated by crop damage caused by recurrent climatic events. Women and children are often among the poor and marginalised people trying to adapt with the little resources they have.

How communities are adapting

In Bangladesh, many communities are doing what they can merely to cope with the impacts of climate change. For example, farmers have started to change the way they cultivate their land; some of them raise the bed of their vegetable fields, while others are modifying their cropping patterns, harvesting water from canals and ponds, improving soil moisture retention through mulching, and increasing the amount of organic matter in their soil. In rural areas of Sirajganj district – where feeding animals can be highly problematic in times of hardship – farmers are now preserving fodder for their cattle. And in areas where water logging is a common problem, farmers are practising hydroponics (soil-less agriculture) for vegetable production. In south-west Bangladesh it is becoming a popular adaptation strategy that increases households' food security.

> *"We do not want to live within water. But hydroponics can be of great help for us during rainy season. It has created alternative income sources for poor farmers like me, as this cultivation reduces fertilizer use."*
>
> **Sham Sarker**
> Farmer, Haridaskhati

In some rural areas, women also dry food in order to preserve it for the lean season. This practice is gaining increasing attention and has started to spread among poor households. Kitchen gardening by women also makes a contribution to household nutrition. It increases their resilience as well, since vegetable surpluses can be sold to provide extra income to the family and seeds can be dried.

Needs, support and policy issues

The needs of Bangladesh's people are clearly overwhelming their ability to cope, much less to truly adapt to the mounting impacts of climate change. The damage from cyclone Sidr – which lasted only one night – is estimated at US $3-4 billion. Given the rising intensity and frequency of floods, cyclones and other extreme weather events, the amount of money that the country would need to adapt to these changing conditions is immense. However, money alone is not sufficient to respond to the needs. Knowledge and skills are also crucial to ensure that money is used effectively and in a manner that really addresses the needs of the most vulnerable groups.

While spontaneous and ingenious efforts to cope with the adverse impacts of climate change are noticeable at community and household levels, limited resources and capacities often hinder these initiatives. Changing planting dates and seed varieties, for example, could help to offset losses and increase yields – if people had access to the information, credit and seeds they would need to implement those changes. Climate change also has implications for justice and equity: poor households and small-holder farmers are more affected, yet support does not necessarily reach them. More attention to these questions is therefore needed.

The government of Bangladesh hopes to go beyond coping to achieve more comprehensive adaptation to climate change. The first pillar of its Climate Change Strategy and Action Plan is food security, social protection and health. For instance, it proposes to:

1. Increase the resilience of vulnerable groups, including women and children, through the development of community level adaptation, livelihood diversification, better access to basic services and social protection (e.g. safety nets, subsidised agricultural inputs, extension services, crop insurance).
2. Develop climate-resilient cropping, fisheries and livestock systems to ensure local and national food security.

3. Implement surveillance systems for existing and new disease risks and ensure health systems are geared up to meet future demands.
4. Implement drinking water and sanitation programmes in areas at risk from climate change (e.g. coastal areas and areas prone to floods and drought).

These measures have the potential to make a real difference in the lives of vulnerable people. The extent to which Bangladesh will manage to implement its ambitious plan, however, still remains to be seen. It will depend in large measure on the funding levels and programme design of international climate adaptation strategies emerging from the UNFCCC negotiations.

Pasture land, Brazil

Brazil: Reducing risk and responding to changing conditions through water conservation and crop diversification

Recent models of climatic behaviour suggest that the north and north-eastern regions of Brazil are likely to be the most dramatically affected by climate change. The forecasts suggest that the Amazonian region will become hotter and drier, which may affect water availability. Already threatened by changes in land use and destruction of tropical forests, Amazonia's ecological system faces new pressure from climate change. Resulting soil degradation, as well as the pollution of springs, streams and rivers, heavily undermines the potential for sustainable forest management. Subsequently, the livelihoods of rubber-tappers, extractivists[38] and indigenous people are affected, and river-dwelling communities that depend on the preservation of these natural environments for their survival are impoverished.

The Northern region of Minas Gerais, one of the places where ActionAid's fieldwork has been conducted, is located in the Savannah area where the climate is semi-arid. It comprises 21 per cent of the state's territory and its population – the poorest of the state – lives in precarious social and economic conditions.

Impact of climate change

Extreme climate events, such as the drought that struck the west and southwest of Amazonia in 2005, may become more frequent in a future scenario of rising carbon dioxide levels, with serious social, environmental and economic consequences. Droughts have a strong negative impact on river navigation (the region's main means of transport), farming, electricity generation, fishing and forest production. Farming families as well as indigenous populations of the Amazonia are therefore directly and indirectly affected.[39]

The part of Brazil most vulnerable to the impact of climate change is the semi-arid region, home to more than 15 per cent of the Brazilian population. In this region, the most optimistic scenario suggests a temperature increase of between 1ºC and 3ºC, and a drop in rainfall between 10-15 per cent by the end of the twenty-first century. In the pessimistic scenario, however, temperatures could rise between 2ºC and 4ºC and rains could diminish by 15-20 per cent compared to current levels.[40]

The agro-ecosystem is also hugely affected, causing intense silting of the waterways. All the farmers interviewed stated that the biggest impact of climate change has been on water resources, including reduction in volume and drying up of water courses.[41] As a result, local production systems and their processing units were destabilised. The reduction of water supplies continues. Consequently, farming families are being pushed away from the area, unable to sustain themselves. Moreover, the variations in terms of rainfalls and temperature also have a negative impact on health, especially on children.

Photo: Celso Marcatto / ActionAid Brazil

Climate change and the right to food

Desertification, resulting primarily from human activities and exacerbated by climatic variations, will likely present a grave threat to the right to food in Brazil. Desertification, or the degradation of land in arid, semi-arid and dry sub-humid areas, is advancing at a rate of 3 per cent each year and is likely to increase in rate. This will impact negatively on regional biodiversity and water availability. It will also reduce areas capable of being used for crop and livestock farming and regional labour markets will suffer. As a result, it is likely that food availability will fall and food prices will simultaneously rise.

A joint study by the Brazilian Agricultural Research Corporation (EMBRAPA) and the State University of Campinas, São Paulo State, Brazil (UNICAMP)[42] examined the nine largest crops in Brazil in terms of area under plantation. It revealed that the impacts of climate change may significantly harm food production, generating losses of up to US $3.7 billion in 2020, and perhaps double this amount in 2070. The Brazilian Northeast will be the most severely affected with large losses in the production of cassava, beans and maize. This will not only have a considerable effect on the amount of food available to local people; it will also reduce the amount of grain and fodder available for poultry, pigs and cattle. If appropriate measures are not taken to support communities and households to adapt, and if more sustainable agricultural mechanisms are not put in place, the consequences for food security may be disastrous.

Box 3: Duzinha's story

Maria do Carmo Gonçalves Dias, known as 'Duzinha,' is a 35-year old widowed farmer living with two children on a 4-hectare property in the community of Raiz in Rio Pardo de Minas. There used to be two streams close by, but these are now dry. For subsistence, she plants cassava, maize, beans and coffee. She also breeds some cattle.

Duzinha says that the dry periods are now much more severe than in the past, when there was a stable period for planting. Today the variation in the rainy season, with its onset changing from year to year and its decline in volume, is reducing food harvests.

Duzinha used to harvest as many as 20 sacks of coffee per year, in a system known as 'farmhouse coffee'.[43] Her last harvest yielded just one sack for the same planted area because the soil has lost much of its humidity. The fall in yields has forced her to buy food at the local market.

Like hundreds of other farmers from this region, this year Duzinha migrated to the south of Minas Gerais for more than two months, working as a casual labourer on the coffee crops in order to get enough money to feed her family.

How communities are adapting

In Brazil's semi-arid region, there is a growing and dynamic movement involving union organisations, civil society, communities and organised groups of farmers who have come together in response to the decrease in food production due to climate change (primarily due to droughts), and are now beginning to rethink how they farm. Among the strategies used to reduce risk are water conservation and diversification.

Farmers in Brazil have realised that, rather than concentrate on planting one crop variety at a time, family farming in the semi-arid region must involve the diversification of productive species, the use of numerous varieties of the same species and diversification of planting periods. With climate variability, farmers have realised that a single area of cultivation may contain several varieties of beans, broad beans, maize, sorghum, manioc, fruit trees, fodder crops, trees that produce timber and firewood, and so on.

In a region with a highly unpredictable climate, the concentration of crops in a single period entails a high

level of risk. Instead of concentrating their crops, the region's farmers normally plant a succession of crops in small areas of land at different times of year. Planting small fields over various weeks increases the chances of harvesting the food needed for survival from at least some of these areas. So even if the region experiences a prolonged dry spell, or excessive rainfall, floods, gales and so on, making it impossible to produce everything that was planted, the diversity boosts the chances of harvesting something.

Box 4: The Brazilian Semi-Arid Region Alliance (ASA)

As well as the irregularity and seasonal concentration of its rainfall, the semi-arid region of Brazil is marked by land and income concentration in the hands of large farm-owners. A sizeable amount of the water available in the region is also concentrated in large reservoirs, which, despite having been built with public funds, are not necessarily located on public lands under the control of local communities. Water, a scarce resource in the region, is still used as a political tool. In many municipalities, water distribution is still exploited in exchange for votes.

The ASA (Brazilian Semi-Arid Region Alliance) is a coalition of non-governmental organizations (NGOs) and social movements. ASA's objective is to promote the sustainable development of Brazil's semi-arid region, based on the principle that access to water is everyone's right. One of the key concepts used by the ASA is that of 'coexistence with the semi-arid climate', which holds that, rather than fight against the drought, farmers should learn to coexist with it, understanding how to cope with the possibilities and problems posed by the region.

This concept of coexistence with the semi-arid climate sets out from the premise that the regional ecosystem has an enormous but undervalued biodiversity with high potential to produce food. The concept also takes into account the considerable inventive and creative capacity of the regional population in constructing more diversified production systems inspired by the strategies of the natural biome itself.

The ASA was founded in 1999 with the alliance of 51 civil society organisations. Today ASA has more than 1,000 member organisations and is present in all 11 states of the Brazilian semi-arid region.

One of ASA's better known initiatives is the One Million Cisterns Programme – P1MC. Its objective is to build 1 million cisterns, a type of reservoir for collecting rainwater, for each family in the semi-arid region. The programme began in 2000 with the construction of 500 plate cisterns. At the end of 2007, the programme had already built more than 220,000 cisterns and there is still a huge demand for more.

The Programme, which emerged from a civil society initiative, continues to be implemented by ASA and is financed by federal government resources through donations from the public and private banks.

The dissemination of centralised rainwater capture and management systems, such as plate cisterns, are examples of water resource conservation and management initiatives that enable farmers to coexist with the large variability of the region's climate. With the risks posed by climate changes, this strategy will have to be deepened with the aim of increasing food production and increasing the local population's capacity to adapt to the changes and ensure their nutritional and food security and sovereignty.

Needs, support and policy issues

The government of Brazil has put in place some measures to support farmers, such as the National Programme for the Strengthening of Family Farming, which provides credit and insurance to support farming families; the P1MC programme, which promotes the construction of cisterns for water conservation; and the Food Acquisition Programme (PAA) – which involves the purchase of products from farming families to supply people facing food insecurity, and to maintain strategic stocks and to support community initiatives to save, produce, store, improve, exchange and disseminate varieties of local seeds.

In spite of these public policies, as well as important initiatives from national social movements and a range of scientific work on the impacts of climate change in Brazil, the country still lacks adequate preparation or sufficient knowledge to adapt to these changes, as acknowledged in a study produced in 2005 by the Centre for Strategic Affairs of the Presidency of the Republic. Existing programmes are not geared towards adaptation, so they do not increase communities' resilience or develop household capacities to adapt. The Brazilian National Congress has been discussing a bill to define a National Policy on Climate Change. If it is accepted, it may lead to better support for adaptation mechanisms. But such approaches should be reinforced with international adaptation funding.

Ghana: Learning from farmers' traditional knowledge and innovation

Agriculture in Ghana is predominantly carried out by small-holder farmers (on plots of up to 1.5 hectares) with some plantations such as cocoa, rubber and oil palm. Livestock production (goats, sheep and cattle) is more predominant in the Northern Regions of the country. ActionAid conducted field research in Pwalugu – in the Upper East region – and Ejura in the Ashanti region of Ghana. In these regions, about 70 per cent of the population is engaged in agriculture. Farmers have already noticed changes in climatic conditions, especially

Abiba Gyarko, clears weeds from a field on her tomato farm, Ghana

in terms of rainfalls and temperatures. Most respondents – especially the elderly – indicated that in the period of the Kwame Nkrumah regime (1957-1966) there was adequate and reliable rainfall in comparison with today, and that the temperatures were also more moderate.

> *"Rainfall here was regular and reliable but sometimes so heavy that buildings collapsed and the White Volta got flooded. What you are seeing [current flooding of farms] used to happen but now the intensity has increased."*
>
> **Fatima, a grandmother from Pwalugu**

Impact of climate change

Farmers from both areas mentioned that rainfalls have become 'erratic, inadequate and unreliable'. Sometimes, the rain period is extremely short or is interrupted during the growing period. As a result, the amount of rain is too small for any harvest to be meaningful, and water supplies are threatened. At other moments, the rain is so strong that it generates floods.

The time when rain comes has also become unpredictable, which makes it very difficult for farmers to decide when to plant their crops. Farmers also notice that the nights are colder while the days are hotter than before. The increase in heat waves not only has an impact on agriculture but also has a detrimental effect on health as well. The dry season is also reported to be

longer than before. Consequently, finding food and water for animals becomes really difficult. Bush fires have also become more frequent and threaten people's lives, assets and livelihood. The depletion of the vegetative cover also leads to severe erosion.

> *"River [White Volta and its tributaries] volumes have reduced and once marshy areas have dried up. But when the rains decide to come, they are torrential, resulting in flooding of our homes and farms as happened last year and now."*
>
> **Focus group with grandmothers from Pwalugu**

Climate change and the right to food

Extreme weather events such as drought and floods have posed a great threat to food security in Ghana. The effect of climate change on agricultural productivity is manifested through the shortage of food, higher food prices and chronic hunger. Unfortunately the ability of poor communities to respond to the challenges linked to climate change is very limited. Without support to adapt, marginalised communities – women and poor people in particular – may see their right to food seriously undermined. Though some affected communities have developed their own coping mechanisms to survive, the impact on vulnerable groups such as women food crop farmers is serious.

Commenting on recent flooding of the area in 2007 and 2008, Iddrisu, an opinion leader from Pwalugu said:

> *"The flooding of this area during the past two years has brought us untold hardships. Our farms were destroyed last year and this year as well. Our drinking water sources are polluted; the few bridges and roads have been washed away. These days we suffer from floods and drought. Sometimes we are temporarily displaced and become refugees in our own region due to floods. Animals have provided us with alternative livelihood in the event of a crop disaster but the few animals that survive the floods are dying of diseases. We believe the lack of animal protein in our diet is the cause of poor nutrition among our children and women. We now have to pay more for food when our stocks are down. The worst of it all is that the young men and women are migrating to the south in search of greener pastures leaving behind the old and the weak."*

How communities are adapting

In order to survive in the changing climate, farmers are attempting to adapt their agricultural practices to the new conditions and to diversify their sources of income through non-farm activities. Crop diversification and mixed cropping, for example, allow farmers to adapt by increasing the chances that they will be able to harvest even when the weather is uncertain. Farmers stressed the importance of non-farm jobs as a livelihood strategy to deal with failures of crop production and animal rearing. Women farmers especially go into petty trading and cottage industries that add value to harvested crops. For example, they peel and dry cassava into 'konkonte' (dried cassava powder) or process shea nuts into shea butter to sell at the local markets to supplement their normal crop production activities.

Farmers from Ghana are responding to these challenges in innovative ways, adapting traditional practices and local knowledge to changing climatic conditions. Women living in the Pwalugu area, for example, are using their knowledge of the varying yields of different plant varieties to increase their chances of harvesting, even if they cannot predict what the weather will be. For example, they plant different seeds on the same piece of land such as sorghum with millet or maize. They also plant early and late maturing varieties of the same crop, sometimes putting the different seeds in the same hole. By practising mixed cropping and mixed seedling techniques, they increase their chances that at least one of the crops will survive.

These women also know that in bad years, local varieties such as groundnuts and water melon will be more profitable than cereals because they are adapted to their local environment and can be sold to purchase other food. Traditional practices such as planting on ridges and mounds allow them to take advantage of the little rain

they get. Additionally, the use of particular local plants and weeds contributes to reducing pest damage without using costly pesticides.

The knowledge of elderly people also allows communities to cope with adverse conditions. A group of men related how they use the traditional medicine that has been passed on to them by their ancestors to treat their animals and prevent diseases. For them, livestock is an insurance against crop failure and a way to diversify their livelihood. In bad years, they can sell their livestock to buy food.

Needs, support and policy issues

When asked about external support action to reduce the effect of climate change, most farmers confirmed that their communities have received assistance from governmental and non-governmental interventions such as drilling of bore holes and wells and construction of dams for irrigation and watering farm animals. These measures, however, are not sufficient to reach everyone and the most vulnerable groups often lack knowledge and skills to implement adaptation measures. Therefore they are constrained to sell the few assets they have.

Farmers in the study areas would want governmental and non-governmental agencies to support their adaptation initiatives. The young men advocated for increased support to access micro-credit, small dams for dry season irrigation, subsidies for agricultural inputs and tractor services. They also asked for early intervention in times of food shortages and drought. The women respondents would want additional support to create new bore holes, micro-credit and assistance with reforestation projects that would provide them with firewood.

> *"Please support us with the provision of wells and bore holes to stop the spread of guinea worm which is rampant in our area. We are also interested in micro-credit to help with our petty trading. We would also need assistance to plant more economical trees to reduce the speed of the wind during stormy periods."*
>
> **Madam Atuguba**
> Pwalugu

Members of a women's farmers club in Salima, Malawi use small scale irrigation techniques to irrigate their garden.

Malawi: Supporting the empowerment, organisation and mobilisation of rural women to ensure access to and control over natural and productive resources

Agriculture is the main driver of Malawi's economy, contributing up to 39 per cent of GDP and employing 80 per cent of the country's labour force. About 6.3 million Malawians live below the poverty line, the majority in rural areas. More than 90 per cent of Malawians living below the poverty line rely on rain-fed subsistence farming to survive. Climate change and weather extremes are having a huge impact on the country's agriculture sector, affecting agricultural productivity and therefore resulting in food shortages and chronic hunger. Crop losses related to natural disasters, such as drought, floods and flash floods, as well as crop failure due to erratic and unpredictable rainfall, pose a great danger to food security, especially for poor and marginalised communities.

Photo: Solomon/ActionAid Malawi

Vulnerability and adaptation studies undertaken in Malawi predict that temperatures are likely to increase by 1ºC, 2ºC and 4ºC for the years 2020, 2075 and 2100 respectively and that rainfall will increase by 2 per cent to 8 per cent by the year 2100.[44] In these circumstances, the number and intensity of drought and floods will increase, with a negative impact on food production. As a result, the number of hungry people will be magnified. If nothing is done to support poor and marginalised communities, their right to food will be severely undermined. Women, who represent the majority of full-time farmers, will be particularly adversely affected.

Impact of climate change

Rainfall data from 1990 to date shows that the Districts of Salima, Chikwawa and Nsanje – where this study took place – have been subjected to climate change and weather extremes in most years. There were recorded droughts in the Shire Valley and Salima during the 1994/95, 1999/2000, 2001/02 and 2004/05 seasons, which resulted in total annual rainfall between 400 and 800mm; this is hardly enough to sustain crop production. Salima was also subjected to floods during the 1997/98, 2002/03 and 2005/06 seasons, which resulted in losses of property; destruction of infrastructure; siltation of rivers; destruction of crops such as maize, sorghum, millet and rice; diseases like malaria and cholera; malnutrition and hunger.

Climate-related hazards have a significant impact on human health. During years of drought, malnutrition becomes a major issue, especially amongst children and the elderly. Any fluctuation in climate leading to adverse weather conditions is likely to lead to significant malnutrition problems among the population as less food is consumed. Children, breastfeeding mothers, pregnant women, the elderly, female-headed households and orphans are among the most vulnerable.

Extreme weather events, combined with a low capacity to adapt to the adverse impacts of climate change, aggravate food security risks. This situation is further compounded by rapid environmental degradation resulting from agricultural expansion to marginal lands and deforestation, inadequate knowledge and skills in the productive use and management of land and natural resources, inadequate access to land and credit, poor health services and gender inequalities.

> *"Yes, the weather has changed a lot since I was a small boy in the early 1940s. When I was a young man, it was very easy to predict the onset of the rains. Chizimaluphya (early rains) would come in October, and then any rains that would come thereafter in November/December would be planting rains. These would tail off in March/April, when the maize is mature. The rains were consistent and predictable. This is not the case now; planting rains can come at any time from October to January, and they can stop at any time. Look, this year the rains, they stopped in January, so that late planted maize was badly affected by drought, and hence the hunger we are talking about now. The rains are erratic, unpredictable and poorly distributed, resulting into extreme weather events, especially floods and droughts. There is need for coordinated efforts by farmers, government and donor agencies to address climate change, otherwise hunger will be the order of the day."*
>
> **Simaewa**
> Village Headman of Chenyama

Climate change and the right to food

Maize production data from Malawi's Ministry of Agriculture reveals that production has declined over the years. The production trends show clearly that the vagaries of extreme weather – drought and floods in particular – have had a direct impact on maize

production. It is also clear that, under current production trends, maize production levels are far below those required to ensure food security for the districts.

The dependence of Malawi's agricultural sector on the climate cannot be over-emphasised. Most of the crops and livestock are grown under rain-fed conditions, therefore any drought or flood has a direct impact on productivity and may result in country-wide food deficits and hunger, especially among small-holders, the most vulnerable groups. The increased severity of floods means increased risks of ruined crops, killed or injured livestock as well as submerged and destroyed infrastructure (roads, footpaths and buildings). People from Mbangu Village, for example, have suffered from floods that have caused extensive and severe damages to their assets and livelihood. They have also observed that the frequency and severity of the floods have increased over the last decade.

The drought experienced in the 2001/02 season resulted in low crop yields and a food deficit of 570,000 tonnes. More than 3.2 million people were affected and the World Food Programme (WFP) spent US $87.5 million on emergency food aid, while the Malawi Government spent an additional US $67.4 million. Some primary schools had to close down due to the hunger crisis, and a large number of children suffered from kwashiorkor (a dietary deficiency disease). Most people started eating wild fruits, roots and tubers and indigenous vegetables, while at the same time eating and harvesting premature maize to avert hunger.

How communities are adapting

In order to become more resilient to climate change, communities and households attempt to diversify their agricultural production and to intensify activities taking place when the weather is favourable. Communities have also begun to embrace methods to improve soil fertility, using organic manure instead of chemical fertilizers. In Salima, for example, farmers use the 'Chimato' system where vegetative material is composted in special mud structures.

The cultivation of winter crops using the residual soil moisture from river banks or flooded areas is also a way to overcome extreme weather events. Farming communities living along rivers, the lakeshore and the Shire valley are successfully adapting to changing climatic conditions by growing a second crop of maize that is planted at the end of the rains in March and is harvested in winter.

As part of the adaptation programmes, many clubs and communities from Malawi are engaging in activities to diversify their livelihood. In many cases, women are leading in this effort. For example, the Salima Women's Network on Gender (SAWEG) has started various income-generating activities (IGA) in order to empower themselves economically. Women and girls in Salima started IGAs after realising that in times of hunger they were vulnerable because their husbands often controlled the money they would need to buy more food. Under the IGA, women are now involved in various activities such as: selling cakes and scones ('zitumbuwa'); brewing beer; making traditional pots or weaving baskets and mats.

Box 5: Rural women mobilise to adapt to climate change

Two years ago, in response to ever worsening harvests and increased food insecurity in their communities, a local women's rights organisation called the Salima Women's Network on Gender (SAWEG) began to organise women into farmers' clubs.

Every month, three representatives from each farmers' club in Salima meet at SAWEG to discuss successes and challenges in their crop production, new agricultural methods and other issues that affect their lives.

Loss of food and income due to failing harvests was one of the major challenges. Because women were no longer able to grow enough food to feed their families with their individual gardens, the farmers' clubs decided it would be better to pool resources into community (club) gardens.

Garden club members share tools, seeds, and knowledge of diverse farming methods, such as the use and application of compost manure. This has led to increased production, and club members each take home more food than they could grow in their individual gardens. When there is extra food, the club sells it at a local market. They pool the money they earn to buy the farm inputs needed to continue and expand their garden. A club member can also borrow money from the club's savings, but she must pay it back with 20 per cent interest.

Because of farmers' clubs, communities in Salima are more food secure today than they were two years ago. Moreover, women have gained a new sense of dignity and pride. Although the women were unquestioning in their need for and right to support from their government and from the international community, they also have a new confidence in their ability to cope with emerging challenges. As evidence of this new confidence, the women are planning to campaign on climate change at the national level – something that seemed unthinkable two years ago. All they need is more resources.

Women in Salima said that, with adaptation funding, they could have a windmill to power engine irrigation pumps, ploughing equipment, water harvesting options, and training in better use of compost manure and organic agriculture. They also expressed a need for funding to do farmer-to-farmer exchanges where farmers could learn from each others' experiences and skills.

The farmers' clubs of Salima offer an example of truly transformative adaptation. They exemplify how adaptation can and must be a process by which people are empowered to act collectively, organise and take control of their own development.

Needs, support and policy issues

Since small-holder farmers produce about 80 per cent of Malawi's food and most of these are poor and depend on rain-fed agriculture, they lack resources to adapt to climate change sufficiently. There is a need for concerted efforts from government, the donor community and funding agencies to assist the farmers to implement adaptation programmes.

Governments must play a key role in providing a policy framework to guide and support effective adaptation by individuals and communities. Some key recommendations of civil society include the need for:

(a) High-quality climate information and tools for risk management that help to improve climate predictions. These will be critical, particularly for rainfall and storm patterns.

(b) Land-use planning and performance standards that encourage both private and public investment in buildings and other long-term infrastructure to take into account the vulnerability of different elements in the community systems.

(c) Governments that can contribute through long-term

policies for climate-sensitive public goods, including natural resources protection that yield various forms of energy, and emergency preparedness.

(d) A financial safety net. This may be required for the poorest people who are often most vulnerable to the impacts of climate change and least able to afford protection.

> *"When the Mungini River overflows its banks, the floods destroy our crops, chickens, small paths, bridges and dwelling houses. My house is also affected by these floods, and we have just applied for compensation from the District Assembly so that we can move to [a] different place on higher ground. Although we are dredging the Mungoni river, with the increased frequency of high intensity rainfall in the future, the river will still overflow, flood our gardens and destroy our buildings. We really need assistance [from] government or indeed anyone who can assist so that we adapt to and mitigate the impacts of climate change."*
>
> **Mai Jairo**
> Mbangu village

The case of Malawi suggests that donors and governments should invest in projects that assist countries in preparing national communications, researching impacts and preparing national strategies. Whilst these play an important role in preparing countries for the impending problems of climate change, there is little emphasis on capacity strengthening of technical experts in their ability to assemble, generate and interpret data to inform climate change adaptations. Furthermore, the case of Malawi illustrates how women are innovatively leading adaptation efforts in their communities. For adaptation to be effective, funding must support women's efforts to reduce their vulnerability to the impacts of climate change, as well as build their capacity to become leaders in their communities.

Nguyen Thi Gai feeding livestock, Vietnam

Vietnam: Advancing efforts to empower communities to take collective action to reduce vulnerability and claim their right to food

In an economy heavily dependent on agriculture, climate change is putting Vietnam under severe pressure. In a technical seminar held in the early part of this year,[45] Mr Cao Duc Phat, Minister of Agriculture and Rural Development of Vietnam, acknowledged that 73 per cent of the population is suffering from the negative impacts of climate change and environment degradation. Poor people are particularly adversely affected.

The trend and intensity of natural disasters such as typhoons and floods is increasing in Vietnam. In 2007 alone, a series of disasters killed 462 people, injured another 856, seriously affected 763,081 households, destroyed 9,908 houses and inundated 173,830 hectares of crops.[46] Moreover, the high level of seawater increases the salinity of soil and reduces the fertility of agricultural land. While affected communities are constantly searching for solutions, the increasing frequency of disasters is overwhelming the ability of local communities to cope with the impacts of climate change. The United Nations Development Programme's (UNDP) 2007/2008 Human Development Report points out that natural disasters represent a major cause of poverty and vulnerability in Vietnam.[47]

Than Van Anh/ HCCD Vietnam

Impact of climate change

According to Mrs Nguyen Thi Hien Thuan, Vice Director of the Branch Institute of Economic Resource and Environment in Ho Chi Minh City, "the climate in Vietnam is 0.1–0.2ºC warmer than in the 10 previous years. The sea level rises [to a] higher level. Despite little change in rainfall, the rainy season has changed, the dry season lasts longer, and rain is concentrated during the rainy season, which leads to the increase of drought and flood".[48] Increases in rainfall means that floods happen faster with higher water levels and happen more frequently than in the past. The stormy season also lasts longer. Additionally, the intensity and impact of typhoons have changed – creating more threats to coastal communities.

As indicated in the UNDP's 2007/2008 Human Development Report,[49] if the temperature of the earth increases by 2ºC, 22 million Vietnamese people will lose their houses and 45 per cent of the land used for agriculture in the Mekong River Delta, the granary of Vietnam, will be submerged under sea water.

Although it receives a lot of rain, Ha Tinh province – where this study was conducted – also has to face severe droughts. Many people indicated that the irregular situation in the hot season recently led to a new phenomenon: "drought even when there was no sun". As a result of increasing droughts, the fields retain less water and paddy fields cannot adapt in such situations, even when irrigated. Flash floods often happen in the mountainous districts of Ha Tinh and neighbouring provinces. Such floods cause major damage to people's homes and household assets, as well as impacting on the livestock and agricultural production.

Climate change and the right to food

Climate-related hazards have dramatic consequences on agriculture. Not only do they destroy crops, they also destroy seeds, reduce soil fertility (by increasing their salinity), undermine crop productivity and increase production costs due to irrigation needs. The lack of fresh water also hinders production. For example, in Ho Do commune[50] the greatest damage can be found in the area of off-season vegetables, which usually brings a good income to the inhabitants.

Floods, typhoons and droughts not only make farmers lose their crops, they also affect other activities. During floods, for example, livestock breeding stops. Therefore, households often sell their buffalos, cows and pigs. Additionally, after floods, people are so busy cleaning and repairing their homes and furniture, tending to animals and restoring their production that they have little time for non-agricultural activity, which reduces their income and undermines their ability to buy food.

Farmers are not the only ones affected by climate change. For families that make their living from fisheries and aquaculture, increases in natural hazards can have disastrous consequences too. Under normal weather circumstances, fishermen can spend five to six hours per day catching fish and crustaceans. Now, the sea is increasingly dangerous and the time fishermen spend at sea is reduced to only two to three hours per day. As a result, their production has reduced by about 40 per cent and they face shortages of food. For households that survive on fresh water fishing, things are not much better. Their sources dry up in times of drought or fish escape in periods of floods. Since seafood is an important component of the Vietnamese diet, the difficulties faced by people engaged in fishing and aquaculture are likely to have an impact on the whole population of Vietnam.

How communities are adapting

Floods, storms and typhoons are now recurrent phenomena in Vietnam. In order to protect lives and livelihoods, farmers throughout the country are getting organised.

Flood and storm prevention committees have been established in most of the communities. By working actively with the committees and by seeking advice from agricultural extension stations in their areas, mass organisations such as women's unions, farmers' associations and youth unions have been able to support their members in implementing agricultural practices that reduce risks from natural hazards.

Flood and storm prevention committees have helped farmers to access the information they need to adapt to climate change by modifying their crops and adopting different techniques. For example, some farmers are now using short-day varieties of maize and other crops to increase their chances of harvesting before the flood

season. They also changed their rice varieties and use technologies to reduce crop growing times – such as covering seedlings with a plastic sheet when it is cold – to harvest before the cold season.

These groups are facilitating knowledge exchanges to better cope with the impacts of increased flooding. Some households engaged in breeding have learned to raise poultry and pigs on banana rafts or high shelves to protect their animals when floods arrive. They also move their buffalos and cows to higher places.

Households that make a living from other activities are also adapting in different ways. For instance, some salt producers have raised their garden ground by up to one metre in order to build warehouses for salt storage and preservation.

Families practising aquaculture are using air ploughs and coconut branches to prevent aquatic livestock from being affected by air shocks when the weather changes. Also, instead of taking water from the sea at the beginning of the tide, people use input water at the end of the tide. All these initiatives show that, in spite of hardships caused by climate change, farmers can get organised and find innovative solutions to adapt.

Needs, support and policy issues

In areas such as Vu Quang District,[51] the possibility of diversifying families' livelihoods is undermined by a lack of knowledge and skills. For example, the field study showed that there is little knowledge about appropriate techniques to raise pigs to increase food security. Most people follow traditional techniques and use agricultural waste products for feeding their pigs. This means that the breeding depends on the production of maize and sweet potatoes. Consequently, productivity is really low and the economic efficiency is undermined, threatening access to food. People and communities living in zones threatened by climate change need external support to raise their awareness and to develop their capacity to use scientific and technological knowledge to adapt.

Recently, the Vietnamese government has started paying a lot of attention to climate change and its effects. Therefore, many national policies, programmes and strategies have been formulated to deal with its impacts. These include programmes about living with flooding; building sea dykes; anti-desertification measures; adaptation to climate change in the agriculture and rural development sector; natural disaster prevention, response and mitigation; coping with climate change and the rising sea level; and finally, a national strategy on food safety for 2020 and vision for 2030.[52]

While these policies illustrate the commitment of the Vietnamese government to tackling climate change, some of the most vulnerable groups have not received the attention and support they deserve. For example, the main focus of districts and communes is often on disaster preparedness and mitigation. Most of the measures to support adaptation to climate change are targeted at coastal areas and tend to forget that mountainous communities also suffer from the adverse impacts of climate change and are generally poorer than communities living in low land areas. There is therefore a need to prepare programmes and strategies to address the specific adaptation needs of mountainous communities, by upgrading irrigation systems and building capacities to manage slope land, develop forests and protect water sources, as well as other activities aiming to reduce vulnerability to desertification, floods and landslides. Similarly, there are policies to support the rice growers (for instance, strategies aimed at protecting and managing rice land cultivation and ensuring food security), but there is not even a draft policy for protecting fishermen.

5. Recommendations

Within the framework of 'common but differentiated responsibility', the UNFCCC states that it is the responsibility of developed nations to *"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"*.[53] This report demonstrates that, although communities are already taking steps to adapt to climate change, their efforts will require a significant infusion of new resources to avoid the most disastrous consequences forecast by the IPCC. Rich countries, which are historically responsible for generating the lion's share of the greenhouse gases that cause climate change, must now provide the necessary funds to enable poor countries to adapt.

This report also underscores that developing nations highly dependent on agriculture are especially vulnerable to the impacts of climate change on food production. It is therefore critical that the post-2012 agreement should protect the right to food by promoting measures to support small-holder farmers and the sustainable agriculture approaches they are embracing to combat the impacts of climate change. This support must go beyond rhetoric and declarations to include concrete financial pledges and the establishment of governance mechanisms for adaptation funds that are accountable to people like the members of the communities referenced in this study.

On the basis of consultations with these and other community partners around the world, ActionAid sees the UNFCCC negotiation of a post-2012 agreement as a crucial opportunity to link the global response to the climate emergency to the concrete needs of those most affected by and least responsible for the crisis. To achieve this goal, ActionAid makes four recommendations to guide the multilateral climate negotiations, and another four to shape national climate adaptation strategies.

Box 6: How to generate the $67 billion

Whilst precise estimates for the amount of adaptation funding needed are difficult to make, the UNFCCC estimates that developing countries will need up to an additional US$67 billion a year by 2030 to adapt to the impacts of climate change. New mechanisms will have to be devised to meet this funding challenge.

The Bali Action plan sets out key principles for such mechanisms: that the financial resources they raise be sufficient to meet the climate challenge, that they are predictable, additional to existing resources and equitable – with the financial burden shouldered by those most responsible for causing climate change and those most able to pay.

There are currently a variety of proposals being debated that could generate the funds needed for adaptation. And because of the scale of the problem, it is likely that more than one proposal will need to be adopted. While much more detail is needed to fully understand how each of these proposals would work, some of the more promising proposals include:

- **Auction of Assigned Amounts Units (The "Norway Proposal"):** Based on commitments to reduce emissions in a post-2012 agreement, a certain number of emissions permits (or assigned amount units) would be auctioned off to Annex 1 countries to allow them to pollute within their national cap. A portion of the revenue raised would go towards meeting the costs of adaptation.
- **Aviation and Maritime Emissions Trading Schemes:** Based on emissions reduction targets set for the aviation and maritime sectors in Annex 1 countries, a certain number of emissions permits would be auctioned off to the relevant entities in each sector. A portion of the revenue raised would go towards meeting the costs of adaptation.

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Box 6 continued

- **Aviation and Maritime Adaptation Levy:** With an aviation levy, passengers would pay a small tax (or adaptation levy) on their airline purchase. (This could be designed such that only first class passengers or only flights leaving from Annex 1 countries are taxed). With a maritime levy, ship owners would be similarly taxed.
- **A Currency Transaction Tax:** This proposal would place a small tax on the foreign exchange market for currency transactions.

Countries must discuss and develop these proposals further at COP 14. An agreement on how to raise new finance to fight climate change will have to be at the heart of the new global agreement to be discussed at Copenhagen in December 2009.

Recommendations for countries in the UNFCCC process

1. The post-2012 agreement must provide substantial new and additional resources for climate change adaptation.[54]

Though specific estimates may vary, the cost of adapting to climate change will be enormous. Donor countries may dismiss even the UNFCCC estimate of $67 billion per year as unrealistic, or point to the impact of the 2008 global financial crisis on their capacity to respond. But the fact remains that they are bound by the framework convention to respond to the adaptation needs described in this report, and that they can use a variety of innovative mechanisms to generate new and additional adaptation funding of at least US $67 billion a year by 2030 (See Box 6). Therefore, ActionAid insists that the Parties take on this challenge with the degree of political commitment it will require.

2. The post-2012 agreement must recognise agriculture as a sector that is particularly vulnerable to climate change, and provide funding for adaptation strategies based on sustainable agricultural techniques that allow communities to combat hunger and realise their right to food.[55]

Given the particular impact that climate change has on agriculture, the post-2012 agreement should recognise the responsibility of the international community and national governments to enhance the food security of vulnerable people. Furthermore, a significant portion of adaptation funding should be specifically dedicated to promote sustainable agriculture practices in the developing world. Such programmes should build on the examples of adaptation strategies in developing countries that have already increased food security, such as those described in this study. And in the face of such significant outstanding need, substantial adaptation funding should be directed to:

- Enhance farmers' ability to respond quickly and effectively to shocks in order to maintain food production, even under rapidly changing climatic conditions;
- Advance farmers' capacity to use organic matter and to employ multiple cropping strategies and livestock production systems that will enhance soil quality, increase food security and reduce exposure to climate shocks;
- Support innovative practices, especially farmer-controlled methods of agriculture based on local knowledge and traditional practices that allow farmers to move away from synthetic inputs and thereby reduce dependence on imports;
- Support community-level organisation – especially of women – to implement creative solutions and hold duty-bearers accountable to implement policies that ensure their access to and control over natural and productive resources.

3. The post-2012 agreement must ensure the effective participation of poor and excluded communities in the governance of adaptation funding.[56]

Many poor communities have been adapting to climate change for decades now, and already have ideas for adaptation strategies appropriate to their specific context. The adaptation financing mechanisms negotiated in the post-2012 agreement must increase the participation of the most vulnerable groups in decision-making around how adaptation funds are disbursed, managed, used, monitored and evaluated. Furthermore, representatives of affected communities must be meaningfully involved in the governance of multilateral adaptation funds to enhance their effectiveness through transparency, accountability and stakeholder participation.

4. The post-2012 agreement must support women's efforts to claim their rights.[57]

Poor women are particularly vulnerable to the impacts of climate change, but are also potential leaders of change and innovation with respect to adaptation. Women must be acknowledged as a vulnerable social group in the post-2012 agreement, and adaptation funding must be specifically directed towards addressing women's needs.

Recommendations for National Adaptation Planning:

1. Adaptation strategies for climate change should be incorporated into all national policies and programmes related to food security and agriculture. Moreover, specific mechanisms must be put in place to ensure that such policies support communities' efforts to realise the right to food within the context of climate change and to ensure that most vulnerable groups are not only able to benefit from such policies, but are involved in the development, implementation and monitoring and evaluation of the policies.
2. Structural changes should be made in the design and implementation of adaptation programmes at country level to ensure adequate focus on food security and to increase the resilience of small-holder and urban farmers by enhancing their capacity to practice sustainable agriculture and by developing safety nets for climate risk management.
3. Public spending on agriculture should be enhanced and oriented towards improving agricultural infrastructure, inputs, irrigation services and national agricultural extension services supporting small-holder farmers.
4. The role of local authorities and civil society in developing, implementing and monitoring adaptation measures should be strengthened. Initiatives should be put in place to develop the capacities to engage in climate-related discussions at national level, to mobilise constituencies around climate change and food issues, and to involve them in the planning, implementation and monitoring of adaptation measures.

2009 will be a crucial year in global efforts to respond to the threat that climate change poses to agricultural production, food security and community vulnerability in the developing world. A successful UNFCCC negotiating process that recognises the urgency of helping poor people adapt to climate change and acknowledges the role of sustainable and resilient agriculture in safeguarding their future may be the last, best hope for those who are already experiencing the worsening impacts of the crisis. Industrialised countries can indeed step forward and fulfill their financial obligations under the framework convention. The time for decisive action is now. Those who are already adapting cannot afford to wait any longer.

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