Climate Frontline

African Communities Adapting to Survive

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Climate Frontline

International concern about climate change is rising rapidly, but international action lags behind. Other reports demonstrate clearly the scale of the problem at the global and regional level. **This report is different: it allows the voices of men and women in vulnerable African communities to be heard directly.**

In *Climate Frontline*, they describe, in their own words, how climate change is affecting their lives and how they are adapting to survive. The five development Non Governmental Organisations (NGOs) involved in the compilation of this report believe that **action to tackle climate change must start by listening toand supporting communities living on the 'climate frontline'**. The accounts presented here clearly demonstrate that:

- climate change is already a reality in vulnerable regions of Africa, and
- communities are doing their best to adapt to their changed environment by building on local knowledge and diversifying their livelihoods.

By sharing the experiences recorded here, we hope that policy-makers, NGOs and frontline communities can learn more about adaptation and begin to work together to transform surviving communities into thriving communities.

However, in order to do this, much more support is needed for adaptation in the form of sufficient, fair and reliable funding support that is spent in a coordinated, responsive and cost-effective way.

This report is published as international climate negotiations gear up for the United Nations Climate Change Conference in Copenhagen 2009. Together with thousands of other civil society organisations, **we are calling for all countries to agree an ambitious, fair and binding agreement on both mitigation and adaptation**.

We believe:

1) Adaptation funding must be sufficient, fair and reliable:

- **Sufficient** – latest estimates are that around $80 billion per annum is needed for adaptation, dwarfing the less-than $1 billion currently available;
- **Fair** – the costs of adaptation must be borne primarily by those responsible for creating the need, i.e. high-income, high-emission countries;
- **Reliable** – funding flows must be predictable and long-term, not dependent on the erratic 'charity' of donors.

2) Adaptation spending must be coordinated, responsive and cost-effective:

- **Coordinated** – a single adaptation funding mechanism should replace the current proliferation of separate funds;
- **Responsive** – priority must be given to the worst-affected countries and communities;
- **Cost-effective** – spending should be channelled via the most cost-efficient routes, including civil society organisations.

At the same time, high-income, high-emission countries must rapidly reduce their own emissions, as well as support investment in low-carbon development paths for low income countries. The costs of mitigation must be borne in proportion to responsibility for the production of the greenhouse gas emissions that have contributed to the climate crisis.

September 2009

Africa Adapting to Climate Change

Climate Change

Greenhouse gases in the atmosphere, one of them being carbon dioxide (CO2), assist in keeping the Earth warm and stabilising surface temperatures, thus creating the conditions which allow plant and animal life, including humans, to flourish. Our modern society has developed within a relatively short period of very stable climate. Modern agriculture in particular is dependent on predictable seasons, temperatures, rainfall and sunlight. Since the onset of the Industrial Revolution, the Earth's average temperature has risen by 0.76°C. The rise in temperatures is caused by excessive consumption, especially in industrialised countries, of fossil fuels like coal, gas and oil, which release CO2. According to the United Nations Intergovernmental Panel on Climate Change (IPCC), global temperatures will rise a further 1.8 – 4°C unless greenhouse gas emissions (mostly CO2) are significantly reduced. If global temperature rise exceeds 4°C above pre-industrial levels, irreversible and catastrophic climate change will be more likely. The IPCC has stated that "warming of the climate system is unequivocal", and confirms that most of that warming is "very likely" due to the increase in greenhouse gas emissions from human activity.

Source: IPCC Summary for Policymakers 2007

While most people in the Northern hemisphere are still debating and worrying about how climate change will or will not affect them, some of the world's poorest communities are way ahead of us. It is amongst the rural communities in Africa (as well as Asia and Latin-America) that we find the frontline of climate change. Not only have they been living with climate change for years, but they are already effectively implementing strategies in order to adapt to the changing conditions.

On the following pages, people from all over Africa share their experiences on how everyday life can be deeply affected by a changing climate.

A Glimpse of the Future

A majority of Africans live in rural areas and are directly or indirectly dependent on agriculture for food and income. The accounts collected here paint a worrying picture of climatic changes seriously affecting African farmers. The stories are of great importance because, not only do they reveal the extent of the problems facing many Africans today as a result of climate change, they also serve as a grave warning of how these difficulties will increase in the years to come.

Africans Have Found Successful Adaptation Methods

In order to survive, these farmers have already had to change their way of life and the way they farm. Many of the adaptation methods they have implemented are proving to be highly successful, and their experiences can be put to good use in neighbouring villages and regions – or even be attempted in other countries and on other continents. As the need for climate change adaptation becomes more extensive with increasing climate change, the lessons learned today can reduce suffering tomorrow.

African Farmers Cannot Combat Climate Change Alone

Even though many of the measures being undertaken are small-scale and relatively inexpensive, they are usually dependent on outside support, either financial support, technical knowledge, organisational skills or political influence. Local and national governments and international bodies should recognise that the adaptation methods implemented so successfully in local African communities are important ways forward in the global struggle to reduce the harmful effects of climate change. These methods can be scaled up and spread further afield. The greatest challenge is not knowing how to adapt to climate change, but gathering enough support for working methods to be put into action.

The Key is Diversification

The problems facing poor rural African communities are complex and so are the causes and effects of climate changes on a local level. Because the reality is complex, local communities need a wide range of solutions and coping strategies. Each of the following stories highlights a relevant method or strategy for adapting. Some strategies will focus on management of water and wood resources, others on agricultural improvements, while some people will have to change their livelihoods altogether. However, a combination of several methods is necessary in order to strengthen vulnerable communities. As many of our accounts reveal, diversification is a key factor in successful climate change adaptation.

Climate Change Adaptation is Also Reducing Poverty

No one should be under the impression that there is a quick fix that can eradicate the consequences of climate change. The only lasting solution is to reduce global emissions and this can only happen if there are political changes on an international level. However, the concrete steps undertaken by the men and women in these accounts do more than just temporarily adapt to climate change; they also ensure long-term sustainability and reduce poverty. It is, therefore, of the utmost importance to scale up successful adaptation projects like these in accordance with local needs and conditions.

"Africa is one of the most vulnerable continents to climate change and climate variability, a situation aggravated by the interaction of 'multiple stresses', occurring at various levels, and low adaptive capacity."

Source: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, page 435.

Extreme Weather

Abdiullahi Hassan Ahmed

Habiba Ibrahim

Climate change is nothing new in Africa, where weather patterns change according to natural cycles. However, many African countries have for the last decades experienced changes which seem out of the ordinary. More extreme weather, such as heavy rainfall, results in devastating floods. In this account from Adadley in Somaliland, two farmers describe how their farms were damaged by flash floods in the spring of 2009.

A Well-Organised Village

Abdiullahi Hassan Ahmed and Habiba Ibrahim are both farmers in the village of Adadley in Somaliland, the northwestern part of Somalia. They are relatively well-off compared to many other Somali farmers. Abdiullahi grows fruit and vegetables on almost two hectares of land irrigated by a shallow well. Habiba is in a similar situation. Her farm sits on the riverbank, and she is able to draw water from a well. Habiba has been a widow since 2001, but is able to support her five children thanks to her farm.

In this fairly well-organised village, one of the inhabitants owns a truck, which he regularly drives to the capital, Hargeisa, carrying produce from farms to the village. While still poor, Abdiullahi has been able to make a reasonable profit from this trade with the city, spending the surplus on cereals and other food items and investing in his children's education. Like Abdiullahi, Habiba sells most of her produce, either in Adadley or in Hargeisa.

Destruction

The Al-Shabaab militia, which is ravaging South and Central Somalia, and the pirates operating out of neighboring Puntland, both seem distant menaces to people in the area called Somaliland. But another threat has become more acute: the effects of climate change.

"The flash floods on May 14 this year [2009] were the worst I have ever seen," says Abdiullahi. "My farm was one of the hardest hit, but other farms in Adadley were also severely affected. The flood destroyed my well, and 34 fruit trees were washed away. Even papaya trees, which are usually able to withstand floods, succumbed."

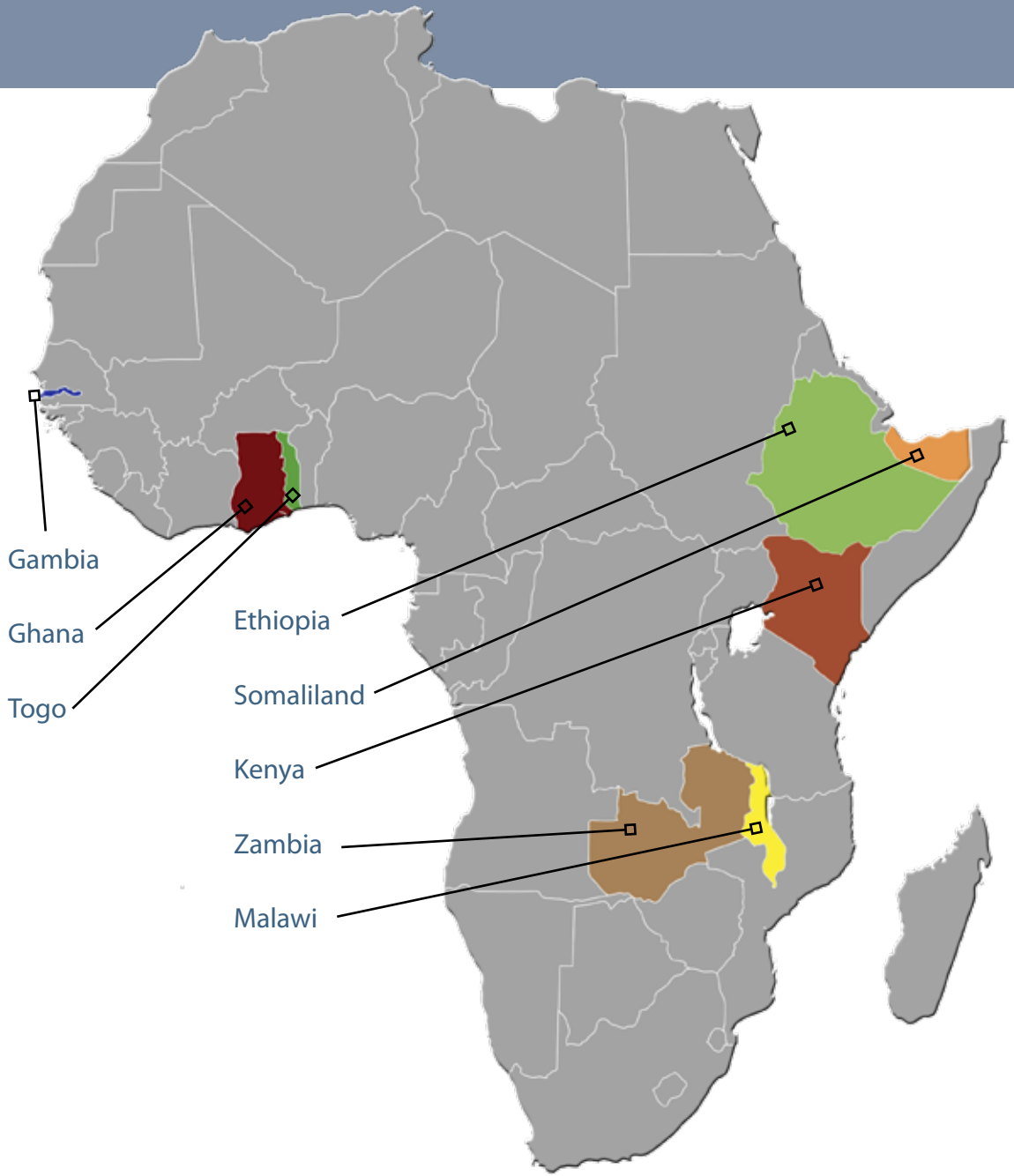
Habiba also suffered: "I lost my well and many fruit trees. My vegetable garden was washed away, along with most of my farming equipment, like shovels, hoes, wheelbarrows and water pipes. All were lost to the flood."

The floods in Adadley are an example of what will become more common if the world's temperature continues to rise. Before the flood, this patch of sand was cultivated farm land.

Global Climate Change

Several African countries have experienced sudden and severe floods in recent years. Floods wash away crops, kill animals, and destroy houses and infrastructure. The floods are caused by heavy rainfall over a short time period. Villages and towns not directly affected by the rainfall may also be flooded because they are downstream from the rain catchment area. Deforestation in the catchment area is an important factor in causing and aggravating the effects of floods because it leads to soil erosion, which in turn leaves the ground with less capacity to absorb large amounts of water. It is never possible to attribute a single flood or storm to global climate change, but the floods in Adadley are examples of what will become more frequent if global average temperatures increase by 2 or 3 degrees above pre-industrial levels. Abdiullahi and Habiba's losses reveal the human suffering that lies behind the statistics that dominate the debate on global climate change.

Somaliland: Since 1991, Somaliland has asserted its independence from the rest of Somalia. However, it is not recognised as an independent state by the international community. Somaliland enjoys relative peace and stability, in contrast to the difficult situation in southern Somalia. There have been several peaceful elections in Somaliland where they have developed their own unique form of democracy, with an elected lower house of parliament, and a guurti, or upper house, of clan elders.



Africa

The articles on theses pages have been collected from the highlighted countries.

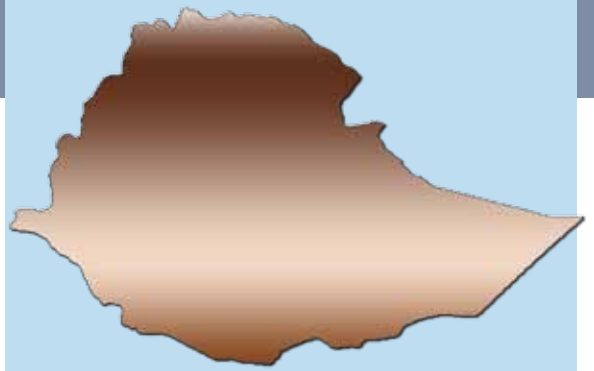
Climate Change: Unpredictable Rain

Of all the negative consequences of climate change for Africa, by far the most serious is the change in rainfall patterns. The United Nations Intergovernmental Panel on Climate Change (IPCC) has estimated that by 2020, between 75 and 250 million people in Africa will experience increasing problems accessing water because of climate change.

Across the continent, both the cycle of rainy and dry seasons and the total amount of rain differs greatly from one area to another. Almost all areas have a dry season, and so periods of shorter or longer droughts are not a new phenomenon. However, a growing number of communities are now experiencing unpredictable rainfall.

The following accounts show how these changing rainfall patterns are affecting communities, and how these communities have responded by adapting the way in which they live and farm.

Dam Enables Three Harvests a Year



Ethiopia covers an area of 1,104,300 square km and has a population of 85.2 million. The extreme poverty rate is 23% and the literacy rate is 43%. Approximately 66% of children are in school. Agricultural production amounts to almost 50% of Ethiopia's Gross Domestic Product (GDP). **Tigray state:** Beriha Goitom and Berhane Gebru live in the most northerly regional state of Ethiopia, Tigray. The Tigrayan landscape is dominated by crags, cliffs, mountains and ravines. The mean annual temperature is now around 15-20˚C. There are two rainy seasons; a shorter period of rains called belg from February to May and kiremt between June and September. The traditional crops are teff, barley, peppers and maize. Because of widespread infertile conditions, and heavy reliance on the rains, the area has suffered from food shortages and famines.

Read more about farming and farming conditions in Tigray on page 28.

A new dam has changed the lives of a farming family in Tigray, Ethiopia, after years of unpredictable rainfall. The construction of a barrier across a small water course has established a reservoir of water, which has ensured two to three harvests annually. This dam has been a key factor in the community's efforts to adapt to climate change.

Beriha Goitom and her husband, Berhane Gebru, are two of the inhabitants who have benefited from the dam: "Before the irrigation there was just one harvest, but because of the dam, we are paying off our credit, buying animal feed and sending our children to school. We do not waste; we save and pay off the loan. Last year we repaid 75% of it."

From Swamp to Desert: Beriha Goitom, 49, has lived in the area all her life. For 35 years she has been married to Berhane Gebru, who is now 55. The family compound has a typical adobe hut with children and dogs running around. The couple has seven children between the ages of 10 and 34, and three grandchildren.

"This dry mountainous area was cold and there was high rainfall," says Beriha, "and this patch of farmland was a swamp. Crop production was difficult because of water logging. But as time went on, the moisture level fell and the temperature got very high. The upper catchment area was highly eroded.

Beriha Goitom and Berhane Gebru in front of their modern beehives together with their daughter Masho and granddaughter Tsegay

"In addition to drought and high temperatures, hail is becoming a problem. This is a new trend.

Before there were hail stones, but they were not as big. For the past few years, big hail stones have fallen every year during kiremt, affecting our teff, barley, wheat and pepper crops."

Dam Compensates for Change in Rain Patterns: Beriha goes on to describe the problem with the rains: "Sometimes the rainy season comes early and finishes early. The seedlings sometimes die because of the shortage of water. The rainy season is now short; it

"Previously there was no excess at all, but now we have been selling the surplus."

can appear any time between June and December – you cannot predict when. Also, the amount of rain varies each day; one day you will have a downpour, the next a light shower. The distribution of rainfall used to be much more even."

The new dam allows water to build up during the wet season and, with the assistance of electric pumps, the farmers can irrigate their fields throughout the year, allowing them to make a second, and sometimes even a third, harvest.

A Surplus at Last: The dam has also made it possible to introduce new crops: "In the past, we had the traditional crops," says Beriha, "but now we have also introduced fruit and vegetables. We consume what we need and sell the rest. Previously there was no excess at all, but now we have been selling the surplus for the last four years. Our house used to be a small hut, but now there are two rooms with a corrugated iron roof.

"With the extra income, we have started sending our children to school for the first time.

Our eldest son, Kinfe, who is 20, has completed high school and is to go to college next year. He lives in the nearest town, 35 kilometres away. He wants to become a government employee. When he has enough money, he is going to buy us a Holstein cow, which costs about 9,000 birr ($800). Our 10-year-old son, Aregawi, was planning to join the Church, but now he wants to go to school and get a job. All our children want to go to school now."

A regional NGO, the Relief Society of Tigray (REST), helped the family with the dam construction.

"REST also extended microcredit that has allowed us to buy two cows that produce more milk, and we were also able to buy five modern beehives. The hives can produce a maximum of 75 kg per year and one kilo can sell for 40 birr ($3.50)."

Plans and Hopes for the Future: Beriha and Berhane are positive about the future. Their area now has small patches of cultivation and clumps of trees, and the turquoise dam is populated by wading birds. Beriha, who works from 7:30 am to 5:00 pm planting, hoeing and weeding, explains the effects the adaptive strategies are having on their lives: "The temperature has mostly become higher in the places where there is no vegetation. But now, locally, the temperature is good." Increased vegetation has improved the micro climate in the area and although Beriha acknowledges that it has not completely recovered, there is a positive trend.

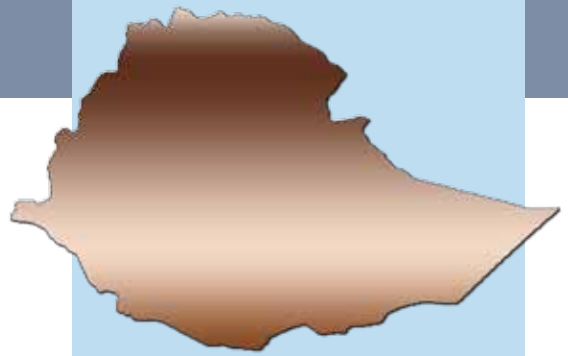
Berhane Gebru

The couple also has ideas about how to further improve the work they have started: "A dam in the upper catchment area and a reservoir would be good. We want to expand irrigation and start growing oranges and bananas. If it gets too much for us, we will hire day-labourers!"

Beriha Goitom

You can read more about the Relief Society of Tigray (REST) and The Development Fund on pages 50-51.

Change From Pastoralism To Irrigated Farming



Afar, Ethiopia: Fantida is in the Afar state of North East Ethiopia. Afar is a dry and hot region. Fantida is situated 900 metres above sea level, but despite the high altitude, temperatures often rise well above 30°C. In the Fantida area, there were traditionally three rainy seasons: sugum, which lasted for a couple of months around April; karma, a four-month rain period from June to September; and deda, a couple of months of rain late in the year. Nowadays rain falls only during karma. The rainfall is sporadic and the amount is dramatically lower than what was considered normal in earlier times.

Find out more about more about Ethiopia on page 12, and more about pastoralism on page 38.

The climate in Fantida in Ethiopia has always been harsh, and its people have traditionally led a semi-nomadic pastoralist lifestyle, herding cattle and camels, to maximise the area's limited natural resources. Today, because of climate change, there is hardly enough fodder and water for the animals, so the pastoralists are trying to irrigate their land to make it suitable for cultivation.

Fantida village lies on the banks of the Awash River, and has a population of just over 600. FARM-Africa helped the villagers build a narrow water canal from the river and provided hand pumps, allowing the immediate land area to be irrigated.

Rising Temperature Brings Diseases: Haisemma Dellihu has taken a leading role in the village's transition from pastoralism to agro-pastoralism. He is 38 years old, has two wives and 11 children, aged between 14 days and 23 years. According to Haisemma, the area has experienced serious climate change over the last 30 to 40 years: "In the time of our fathers, conditions for rearing animals were good. The dry seasons were not so hot and there was only a limited amount of disease. Rain came in three seasons: sugum, deda and karma. There was plenty of fodder and water for the animals in the wider area.

Haisemma Dellihu and a group of villagers next to one of the pumps used to irrigate their fields. In the background is the newly constructed canal leading water from the Awash river to the village's farm lands.

"Now, because the temperatures have risen so much, disease is a problem and we only get a little rain during the karma season. Before climate change brought such dry and hot weather, we had meat and we utilised various products from the animals. Now we do not even have enough milk.

"Fodder – acacia and grass – was not growing well so we had to reduce the number of cattle. Then we needed to shift from large animals like cattle and camels to smaller animals like sheep and goats. We used to have large numbers of cattle and camels, but now we only have a small

number of sheep and goats, due to less grass. When even the sheep and goats started to contract diseases, we started looking for other options like growing crops."

Becoming Farmers: For the last two-and-a-half years, the community of Fantida has been working with FARM-Africa to learn and improve their agricultural methods; "We did not have any farming experience, so we needed technical and practical training," says Haisemma. "We have learned how to hoe, plough and sow. This area used to be covered by acacia, but now we are trying to clear it, plough the land and plant maize, tomatoes, onions and peppers. Irrigation has made it possible to produce crops and fodder for the animals which, in turn, generates additional income for bringing up our children."

Shift to Farming Improves Status of Women: One of the consequences of the shift from pastoralism to farming is the increased involvement of women in food production. This, together with workshops organised by FARM-Africa to promote gender equality and discourage female circumcision, has resulted in a higher status for women in Fantida. Haisemma seems pleased with this change: "Previously women had a very heavy workload. They collected firewood, cooked, kept goats, and cared for children and the elderly. Now they are participating more in meetings and development activities. There is also a bit of a change at the home level. Men have started to assist women at home and women are becoming more involved in farming."

Haisemma Dellihu

A Farming Future: The farming experience in Fantida has been a positive one and they are hoping to expand this work. However, expansion depends on external support, as Haisemma explains: "Before the canal, we did not have any alternative ways of survival. During a drought, we moved the animals from one place to another, trying to find water and fodder for them. Now we have a large arable area, but we don't have enough seedlings and water to cultivate such a large area. We need more water pumps, seedlings and vegetable and crop seeds. If we receive help with this, we can come up with a new strategy for life."

You will find a further presentation from FARM-Africa on pages 50-51.

The pastoralists' new arable area.

Water Under Our Feet

Until recently, finding water was a time-consuming and arduous task for the villagers of Makuka in Kyuso District, Kenya. Their main water supply was situated some 20 kilometres away. However, during the first part of 2009, the villagers themselves dug two wells to access groundwater within the immediate area.

Initially, the only support received was in locating the water source. Thereafter, using only shovels to remove soil, and hammers and chisels to bore through sections of hard rock, the villagers dug until water was reached at 52 and 67 feet (15.8 and 20.4 metres respectively).

After the water was located, a local organisation, the Mitamisyi Poverty Alleviation Programme (MPAP), provided support in the form of well linings and hand-pumps. MPAP also helped to build cattle troughs and latrines, which are needed to ensure that the water supply does not become contaminated.

25 villagers, women and men, agreed to participate in a discussion on their understanding and experience of climate change.

Sand and Water Porridge: *How has the climate changed?* Kitunda Mutava: "I was born in 1932 and I have lived most of my life in Kyuso. It is obvious that the weather has changed a lot. We see rain in January; we never saw that in the past, and we see no rain in October when the long rains used to start. It has not rained at all this year and our crops never even germinated."

Mwikali Kiteme: "The long dry season usually begins in July, but look around you, it is already dry and it is only early June. Our gardens should be full of crops for harvesting, and the bush should be providing grazing for our livestock, but it is all bare and it was the same last year as well. I have heard of children in one family trying to make porridge out of sand and dirty water. How can we endure this?

A group of Makuka villagers at the site of their hand-dug well.

"Previously rain might have failed for two consecutive seasons, but now it can fail to rain properly for eight consecutive seasons. The last good rains we had here were during the El Niño of 1998.

What was it like in the past? Kitunda Mutava: "In famines of the past there was little food for sale. Today, there is food but little money to buy it with. In times of famine, we would travel to Meru district, which is on much higher ground and has good rainfall. We searched for work and would be paid with food. Of course, we also had our livestock even though there was always the problem of water, even when there was grazing."

Kenya's area is 580,367 square km and it has a population of 39 million. The extreme poverty rate is 20% and the literacy rate is 85%. Approximately 75% of children are in school. More than 70% of the Kenyan population is employed in agriculture. Kyuso district: the Kyuso district, where the village of Makuka is situated, lies in one of Kenya's most arid regions. The low average rainfall is further decreasing and the rains have become unpredictable. The lack of rain, together with decreasing soil fertility and the spread of crop and livestock diseases, is increasing food insecurity. In the past, drought every three years and famine every ten years was considered normal in this region. Now drought has become an annual occurrence and famine a constant threat. In

Kyuso district, this means six hungry months annually. Diarrhoea and waterborne diseases such as typhoid, resulting from poor water quality and lack of sanitation, are a large problem. Most household water is contaminated.

"Now it can fail to rain properly for eight consecutive seasons," Mwikali Kiteme, centre.

Traditional Crops Do Better: *What are the most serious changes you have seen?* Kitunda Mutava: "We should have rains twice a year, but now we are lucky to get showers to give us pasture. This is the place where millet, sorghum and cowpeas are traditionally grown. But people have changed to maize and beans. There was never enough rain for those crops and people in the past knew that. Our children used to chase the birds which attack millet and sorghum, but nowadays our children are at school and adults do not want to spend days chasing birds. They want to go to Church and to the market so we cannot blame the climate for everything."

How many people here planted millet and cowpeas this year? Kasembi Muthui: "I planted maize and beans but nothing grew this year, not even the millet and sorghum because it's so dry, so we are all in the same position."

Would you change the way you plant and return to traditional crops? Kasembi Muthui: "We have no choice. We have to change back to the way we lived before. Millet and sorghum are good foods and are not as damaged by insects and they do not need much rain. We have to try and give our children a future here as there is nothing for young people in Nairobi anymore, unless they are lucky to get good jobs."

Keen to Learn New Water Harvest Techniques: *You have managed to dig two wells by hand and have found a reliable source of water for you and your livestock. What does that mean for you?* Peter Musya: "It is unbelievable. For years we trekked all the way to Ngomeni, 20 kilometres away, to fetch water. We never knew we had water under our feet. We will always pray to God to give us water from above, but now we can dig for water. It is our water and we have worked for it. We know we can grow at least some food when the rains fail or when it rains very little. We can grow fodder for our livestock so that we do not have to sell them when prices are poor during drought. We can have beehives, as bees need water as well as forage."

And what about the land? Is there anything more that you are thinking of doing with it? Peter Musya: "If you look at the gardens, they are dry and wasted. The heavy rains are washing away the soil and leaving bare ground that lets all the water run to the river Tana. We know we have to preserve the soil so that the water goes into the ground and that the soil also stays. Now we know what we can do together, we want to make the most of what we have, even though the climate is working against us. We want to learn about other forms of water harvesting that can work. We know they require a lot of work but we are capable and committed."

You can find more information about Concern Universal and the Mitamisyi Poverty Alleviation Programme (MPAP) on pages 50-51.

Kitunda Mutava

Conclusion: Unpredictable Rain

The accounts in these pages show that communities all across Africa are worried about current changes in rain patterns. The weather is not what it used to be just five, 10 or 30 years ago. The rain does not fall when it should, the season only lasts for short periods, or it rains more than before, causing devastating floods. In short, the rain has become unpredictable and no longer follows set patterns.

50% Yield Reduction

Increased water shortages are the main problem associated with these unpredictable rains. It doesn't rain enough for crops to mature, natural rivers and ponds dry up and groundwater levels decrease. In other words, it is becoming harder to access sufficient water to sustain people and animals, and uphold food and fodder production. According to the IPCC, some African countries may have their yields from rain-fed agriculture reduced by up to 50% by 2020, leading to increased malnutrition and lower food security.

Improving Water Access is Possible

The accounts you have just read show how people and communities in Africa are using ingenuity, drive and locally-based solutions to improve access to small and diminishing water supplies, and to provide a consistent water supply throughout the year. Their experiences can be replicated by many thousands of other families in similar situations. However, increasing problems with access to water cannot be solved by personal or village initiatives alone.

Cooperation, Knowledge and Technology are Necessary

As we have seen, African communities are implementing life-improving methods that work, but in each of our three examples, the communities have also received help and support from outside organisations in the form of knowledge, technology or economic resources. Dams, like the one in Tigray, Ethiopia, cannot normally be built without outside guidance, including advice on where and how to build a lasting dam, and how to avoid water shortages for people living downstream. Wells of the type that were dug in Makuku, Kenya, can be promoted in villages all over Africa, but cooperation and supervision is often needed because many countries are experiencing sinking groundwater levels due to over-consumption of water.

Many pastoralists across Africa are coming up against the same problems raising their livestock as the people of Fantida in Ethiopia. In several places, pastoralists are also under pressure from the authorities to give up their traditional way of life and become settled farmers. This is not necessarily a good solution for all pastoralists (see page 38). However, it is a necessary strategy for some and, as the account from Fantida highlights, this option should not be promoted without training in agricultural and sustainable irrigation techniques.

Adaptive Measures Cannot Compensate for Unpredictable Rains in the Long Run

There is no doubt that many people across Africa are already experiencing water shortages because of climate change. None of the practical solutions to compensate for growing water shortages influence rainfall patterns. If the current climatic conditions continue, or if there is even less rain in the future, there will not be enough water to sustain many African communities. These communities will then be forced to relocate in order to find alternative livelihoods.

Climate Change: Deforestation

Deforestation is a widespread environmental problem in Africa. The African continent has the highest deforestation rate in the world and about two thirds of countries define deforestation as their main environmental concern*. While logging is a concern in some countries, the main problem is deforestation caused by demand for agricultural land and firewood for households.

Since living plants, trees and forests are an important store of carbon, deforestation releases carbon into the atmosphere and accelerates the process of climate change. Furthermore, deforestation leads to soil erosion and floods, thereby adding to other effects of climate change.

While deforestation contributes to climate change, saving or planting trees has several benefits. Not only does reforestation absorb carbon dioxide from the atmosphere, but trees are beneficial for local communities for firewood, food, shade, fixing nitrogen and reducing soil erosion.

**Source: Africa. Atlas of our Changing Environment 2008. www.unep.org*

Ghana's area is 238,533 square km and it has a population of almost 24 million. 55% of the population depends on agriculture for their livelihood. The extreme poverty rate is 30%, the literacy rate is 58%. Approximately 72% of children are in school. Ghana was the first country in colonial Sub- Saharan Africa to gain its independence. It is rich in mineral resources and is the world's second largest producer of cocoa. In 2006, large oil reserves were discovered off the coast of Ghana.

Gare lies in the Upper East Region in northern Ghana. You can read more about the agriculture and the climate of this region on page 36.

Disappearing Forests, Rivers and Ponds

Samson William Batang is a peasant farmer in the small community of Gare in the Upper East Region of Ghana. He believes his environment has radically changed in the course of the last 20 or more years. The Gare area and surrounding communities used to be covered by thick forests, with ample natural ponds and rivers. Most of the forests and ponds have disappeared, resulting in decreased soil fertility and lower food and fodder production

Samson is married with three children. In total there are 16 people in his household, which is typical of most of the traditional households in the area. Samson and his family depend on farming, dry season gardening and animal rearing.

Samson William Batang

Intense Heat: Soil fertility levels have deteriorated over the years, thereby impacting negatively on crop yields, he says: "15 to 25 years ago, you could cultivate a small parcel of land and get enough food to feed the whole family throughout the year. Now, not even large parcels of land yield enough to feed a family. 20 to 30 years ago, harmattan [cold weather conditions] set in around November, which created perfect conditions for the fruiting of certain tree species. Now, intense heat waves occur almost throughout the year."

Pointing to a mahogany tree, Samson says: "This tree, a particularly thorny tree used in feeding animals, was very common around here and also provided a means of treating certain ailments. These days they have almost disappeared. The intense heat waves increase water evaporation and eventually

– Because of poor growth, farmers in most cases have to buy additional seed to replant, thus increasing their costs of production.

dry up our water sources. The heat also reduces agricultural productivity as farmers easily become exhausted when working on their farms."

Problems Resulting From New Rainfall Patterns: The people of Gare are also experiencing unpredictable rains. "It is no longer possible to forecast when rainfall will start or end," says Samson. "The new rainfall patterns have led to increased numbers of insects in the soil and to the wilting of plants, which in turn results in poor germination. Because of poor growth, most farmers have to buy additional seeds to re-plant, which increases their costs of production."

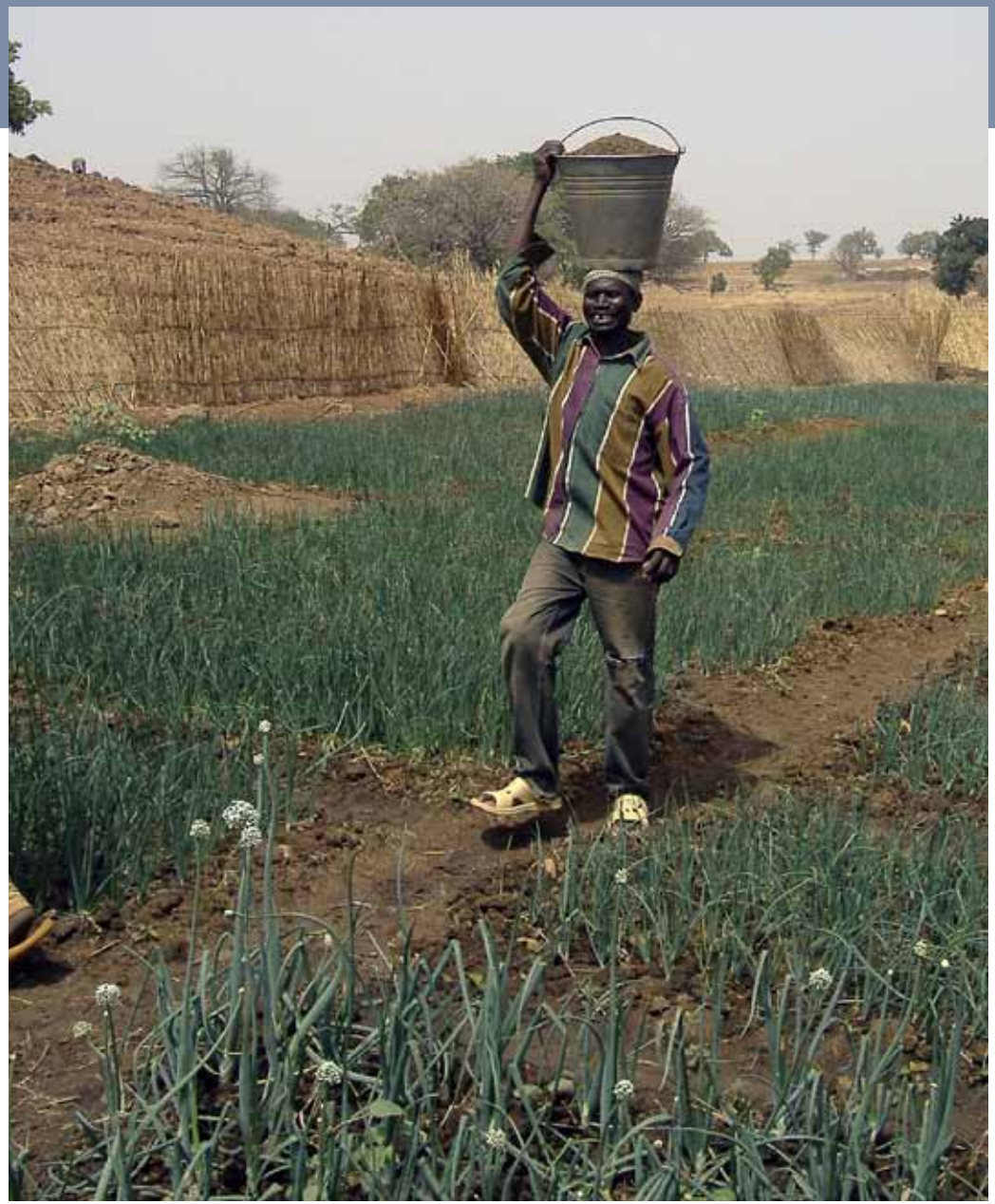
In addition, there are times when excessive rainfall leads to flooding. In 2007, there was a severe drought for several months, followed by heavy rains, which continued for days. The result was massive damage to farmlands and houses, the drowning of animals and, in some cases, the loss of human life.

Tree Planting Improves Soil Fertility: In 2005, Samson and other farmers in his area received practical training in compost manure preparation, stone bund construction, tree-planting and the establishment of tree nurseries.

The training, provided by TRAX Ghana, was designed to check soil erosion, enhance moisture levels in the soil, increase soil fertility and promote micro-organism activities in the soil.

Samson is pleased with the improvements these techniques have had on his livelihood. He farms one-third of an acre of grain in front of his house. Before the training, he says, this land produced just one basin of grain at harvest. "The training showed me that the land had lost its fertility because of severe erosion and continuous cultivation. So I built a stone bund on the land and prepared compost manure for it, which I now apply every year. Now, I can harvest up to three basins of grain from the same land."

You can read more about TRAX Ghana and Self Help Africa and their work on pages 50-51.



New techniques have resulted in higher crop yields.

Mud Stoves Reduce Deforestation

Togo's area is 56,785 square km and it has a population of 6 million. 65% of the population depends on agriculture for their livelihood, the extreme poverty rate is 39%. The literacy rate is 61%. Approximately 79% of children are in school.

Togo is a country with a diversity of landscapes: a sandy coastline, valleys and small mountains in the interior and plains and large savannahs in the north. **Savannah region:** The women constructing new mud stoves live in the northern Savannah region. This region has one rainy season and one dry season. Over the last two decades, the dry season has become longer. The Savannah landscape consists of plains with little vegetation and the vegetation that does exist is vulnerable to human activity which frequently leads to deforestation.

Energy-efficient mud stoves are being used throughout the village of Timabig in the Savannah region of Togo. The women in the village have also planted trees to provide wood for the stoves. These innovations have helped to reduce deforestation, thereby stabilising the vegetation and local climate.

One mother in the village, Lare Dounwague, describes how climate change has affected the community and what has been done to improve their situation.

We Felled Too Many Trees: Lare is a farmer, aged 53, and she has two children, both of whom are in school.

How would you describe farming conditions in Timabig?

"Everything has changed in this world and our situation is critical. We have already sowed, but lack of rain is hindering proper growth. But we too have to take responsibility for the changes: we cut down too many trees without replacing them, so we were not protecting our environment. That caused the lack of rain. There are many other reasons too, like bushfires and population growth."

Improved mud stove for making tchapalot, the local cereal beer.

What are the consequences of this?

"Agricultural production is decreasing despite increased attempts at cultivation. The weather is increasingly hot and diseases are multiplying. People do not eat enough anymore and are not as strong as in the past."

Improved Mud Stoves: *What are you doing to improve the situation?*

"There is much we can do to improve our situation. We plant trees, build stone bunds to prevent soil erosion, we dig compost pits to produce manure and construct energy-efficient mud stoves. We are also making an effort to send our children to school in the hope that they will return to teach us new ways of living our lives."

The women are very pleased with the improved mud stoves:

"In our village, eight women out of ten now use the new stoves in their kitchens and when brewing tchapalot [local cereal beer]. Ata Nounfam, a local woman and expert in the construction of such ovens, teaches us how to build the beautiful, improved mud stoves. Before these new ovens were introduced, we used traditional stoves that used large amounts of wood, even when cooking for small families."

In the old stoves, air was sucked in from all sides, resulting in low energy-efficiency and a high consumption of wood. With the new stoves, considerably less wood is required to prepare the day's food.

We Grow and Protect Trees: *You have said that too many trees are felled. But you need wood for your improved stoves as well? "*

To satisfy the needs of our improved stoves, we have planted trees in special plantations. The objective is to produce additional firewood to supplement the wood coming from the trees in our fields. Nevertheless, we also want to learn new methods of charcoal production so we can make our wood supply even more efficient."

Isn't this time consuming and doesn't it mean extra work?

"It is and it does. But now we know how to cut the branches off our trees without killing them and we also know how to protect our tree plantations. The use of the improved stoves contributes to the conservation of natural resources and meals are better."

When you built the improved stoves, you dug big holes in the ground. Has this created problems of soil erosion?

"The new stoves for the brewing of the tchapalot require a lot of clay and there are large holes to fill. But these holes can be used as compost pits. But we would prefer, if possible, to build our stoves with cement or other solid matter."

Do you believe that your new stoves and tree-planting are making a difference?

"Yes, the improved stoves should be used countrywide and tree-planting should be practiced individually as well as collectively."

You can read more about Self Help Africa on page 50.

Ata Noufame cooking on her new mud stove.

Training Centre Initiates Tree-Planting Campaigns

The Gambia's area is 11, 295 square km and it has a population of almost 1.8 million. 75% of the population is dependent on agriculture. The extreme poverty rate is 34%; the literacy rate is 40%. Approximately 71 % of children are in school. The Gambia is the smallest country in Africa. The Gambia River runs from west to east, flanked by flood plains and small hills.

After some years working as a geology assistant, Badara Jobe returned to his native village of Njawara in the North Bank of the Gambia to become a farmer. His first-hand experience of farming during the climate changes currently affecting the North Bank encouraged Badara to establish the Njawara Agricultural Training Centre to teach environmental farming techniques to farmers.

Climate change poses serious challenges in all of the Gambia's rural and coastal areas, as unpredictable rainfall affects crop production. Deforestation has led to wind erosion, resulting in a significant loss of topsoil, and to a rise in pest infestation and salt intrusion from the Gambia River.

Contributing To Change: Born and raised in Njawara, Badara knows how difficult it is for farmers to survive in the area north of the Gambia River. Moving to an urban centre to finish his schooling, he began working as a geology assistant. However, during his time in the urban area he witnessed from afar his community's increasingly bleak situation as they struggled to produce adequate crops. In 1985, Badara returned home to the family farm, hoping to be able to employ his geological expertise together with his knowledge of environmental farming to make a sustainable living.

"When I first returned to Njawara, things were very difficult, both for myself and the rest of the community. I took a risk becoming a farmer, but I wanted to return home and help make changes which the whole community could benefit from," says Badara.

Njawara Agricultural Training Centre: The local community organisation set up by Badara and his neighbours in 1990 has organised massive tree-planting campaigns. Agro-forestry projects initiated by their Njawara Agricultural Training Centre (NATC) have included tree planting for fencing, windbreaks, food for animals, as well as woodlots for more sustainable fuel production within communities. Construction of large dykes and bunds to prevent salt intrusion have resulted in more fertile soils and increased production yields.

A cornerstone of the NATC educational programme is making farmers aware of methods to combat climate change. Environmental responsibility is incorporated into all aspects of the training and is linked to alternative farming methods designed to improve food production at the same time as promoting good natural resource management.

Reversing Climate Change: According to Badara, the community is aware of the benefits of environmentally sustainable production methods: "Where tree plantations have been protected and maintained, communities and villages have reported improved crop production and higher yields, with less destruction by pests. Many areas also report that salt intrusion has ceased, whereas areas that have not benefited from tree planting have seen poorer crop yields and more unpredictable rainfall."

Successful agricultural production is now widespread throughout the North Bank with Njawara becoming an important production, training and information centre. Youth training has reduced

– Where tree plantations have been protected and maintained, communities and villages have reported improved crop production and higher yields.

migration to urban areas, keeping family units together because young adults now feel they can make a sustainable livelihood within the agricultural sector.

"Climate change is affecting a large part of the country," says Badara. "On the positive side, however, we have proven that by means of community-led projects with multiple phases of action, the negative impacts of climate change can be reversed with short, medium and long-term benefits. We encourage everyone to incorporate climate change activities into their daily lives. The people who have done this are experiencing the benefits."

Badara has been honoured for his work as a social entrepreneur developing farmer-to-farmer methods of spreading knowledge of sustainable agricultural techniques that enable the farmers of the Gambia to confront the challenges of climate change. So far he has worked directly with over 500 farmers in 150 villages and his efforts have already reversed decades of environmental degradation.

You can read more about NATC and Concern Universal on pages 50-51.

Badara Jobe

Conclusion: Deforestation

Deforestation

Wood is used for building materials, cooking and heating. Forests are important for shelter and shade, as habitat for wildlife, and for timber. Forests and trees are also essential in ensuring water quality, regulating river flows and preventing soil erosion. These accounts aptly illustrate why so many Africa countries list deforestation as their principal environmental concern. As we have seen, deforestation leads to local environmental deterioration and it is closely linked with soil erosion and desertification.

Tree Planting

We have also seen that planting trees, and measures to reduce the felling of trees, can reverse the degradation and secure the environment and livelihoods. Reforestation projects initiated by the Njawara Agricultural Training Centre in the Gambia have not only contributed to sustainable firewood production, but the trees planted are also used as windbreaks, barriers for fencing, and as fodder for animals.

Local Gain and Global Advantage

Deforestation by rural communities in Africa is only a minor contribution to global climate change compared to the effects of fossil fuel consumption by the developed world. However, stopping deforestation is still an effective and important measure to reduce escalating climate change, in addition to being highly beneficial to those communities dependent on forests for their livelihood.

Climate Adaptation: Agricultural Methods

Agriculture is the backbone of the African economy; around 60% of the continent's population depends on this sector for their livelihood. However, agriculture is extremely susceptible to climatic changes, and so Africa is particularly vulnerable to changes in weather patterns.

Throughout history, farmers have used their practical experience to develop new and more efficient farming methods. As science, literacy and the world economy progressed, agricultural development increasingly became more scientific and institutionalised. Since 1945, there has been a global spread of the use of pesticides, irrigation, synthetic fertilisers and new crop varieties. These methods increased yields and made it possible to meet the needs of an increasing world population, while reducing hunger.

As the following accounts show, under the current climate conditions in Africa, many of these methods are becoming less efficient and, in some cases, counter-productive. The answer is to develop new methods which are capable of withstanding the effects of climate change.

A Pioneer of New Techniques

Tigray, Ethiopia: Gebrehawarya's farm is in the Tigray region of Ethiopia. Tigrayans are largely subsistence farmers using traditional methods. Other than during, and immediately following, the two rainy periods – February to May and June to September – the Tigrayan landscape is barren. The population has therefore been dependent on farming all available land during the rainy seasons. This has resulted in heavy deforestation, with barely a hillside remaining that does not bear the trace of a plough or terrace.

You can read a general introduction to Ethiopia and the Tigray region on page 12.

Gebrehawarya Wereta lives in the village of Maygua in the Tigray region of Ethiopia. In Tigray, the climate has become warmer and the rainfall scarcer over the last 50 years. In order to survive as farmers, the population has had to use its ingenuity to find new ways to irrigate their land and diversify their agricultural production.

The village of Maygua lies 2,600 metres above sea level and consists of several smallholdings neatly lined with cereal fields and vegetable patches. Gebrehawarya, a youthful 72-year-old, has five children aged between 14 and 30 years and is also a grandfather of two.

Gebrehawarya Wereta

The Belg Rains Have Disappeared: In his 45 years in Tigray, Gebrehawarya has experienced a dramatic change in the region's climate. "A long time ago there used to be sufficient rainfall, but now there is only a little rain. In those days we had two periods of rain - the kiremt and belg - but for the last ten years the belg rains have not appeared. It seems to us that the increasing deforestation is resulting in less rain. It used to be cold here as well, but now it is like the hotter lowland areas where I worked in the old days. These factors have been making life increasingly difficult."

New Produce: Gebrehawarya describes himself as a pioneer in the adoption of new agricultural techniques and technology: "A decade ago, I constructed my own well in just one month. I was very strong then," he boasts. He has also introduced a system of drip-irrigation: pipes, with small holes in them, have been laid out in the fields. Water from a water tank is fed into the pipes and trickles out through the holes, providing a small but constant supply of water for the growing crops.

"In order to change the way things were going, we needed new technology," says Gebrehawarya. "We knew the main problem was shortage of water. With help from the REST organisation, we have constructed four hand-pumped wells so that we can pump water to our fields."

– In order to change the way things were going, we needed new technology.

As the site is at the bottom of the watershed, the four-metre shallow wells collect enough ground water for the community to irrigate their land, regardless of the amount of rain that has fallen. As a result of better irrigation, Gebrehawarya and his wife, 38-year-old Hadessh Kassa, have been able to increase the number of harvests per year and expand into new crops.

Hadessh Kassa

In May, at the end of the dry season, Gebrehawarya's plot contained cabbages, alfalfa, wheat, barley, tomatoes, onions and garlic. Last year, the new wells made a dry-season harvest possible. In total, their harvest brought in 3,500 birr ($310), a substantial amount for an Ethiopian farmer. Last year, for the first time in their lives, they were even able to save money.

Milk, Honey, and Apples: In an enclosure, Gebrehawarya keeps a healthy-looking Holstein cow that is fed on alfalfa brought from the fields. A year ago, 60 farmers in Maygua established a milk cooperative. Gebrehawarya thinks the cooperative might lead to other resource-pooling arrangements in the future.

Gebrehawarya has of late also purchased several modern beehives and planted over 50 apple trees. He explains that he started to grow apples because they fetch 25 birr ($2.20) per kilogram. The prices for other produce are 2-4 birr ($0.18-0.35) for one cabbage, and 700 birr

($62) per quintal of wheat. The apples are sold locally and to various market traders.

I Don´t Want a Tractor: Asked about what else needs to be done to ensure that life in the village remains sustainable, Gebrehawarya stresses his desire for more technology, although he is quite content to continue ploughing with his two oxen, which can plough 40 square metres a day.

"I do not want a tractor, as my land is too small, but I would like an electric water pump," he says. He also suggests that water-harvesting projects should be intensified so that more families in the area can benefit from the dry-season harvest.

You can read more about the work of REST and The Development Fund on pages 50-51.

Miraculous Harvests in a Starvation Area

Malawi's area is 118,484 square km and it has a population of 14.3 million. The extreme poverty rate is 74% and the literacy rate is 63%. Approximately 88% of children are in school, but according to UN statistics, only 36% complete their primary education.

You can read more about climate and food production in Malawi on page 40.

Khangawa Village within the Rumphi district is one of the areas of Malawi experiencing soaring temperatures and drought. It once produced good harvests, but has now been reduced to a 'starvation area'. Many households are suffering as a result but, by defying the odds, one woman offers hope for the future.

Etrida Luhanga, is a 41-year-old widow. Since 2002, she has enjoyed bumper harvests despite the unpredictable rains. At a time of food shortages, her ability to produce good and reliable harvests – and thereby ensure food security for her family – is an important example of what can be achieved.

Organic Fertilisers and Maize Pits: Climatic conditions are affecting animal rearing and crop production in the Rumphi district. Rainfall patterns have changed greatly and agricultural activities have become difficult to plan. "I owe the miraculous harvests to the use of organic fertilisers (manure) and the planting of maize in pits instead of using chemical fertilisers and planting maize in the traditional manner," explains Etrida.

Etrida Luhanga demonstrating liquid manure-making and application.

Simple Methods, Big Differences: Maize-pit planting is a simple, but highly effective technique. Maize that has been planted in pits shows conspicuous differences from maize planted on conventional ridges even if the fields are adjacent and growing in very homogenous climatic conditions.

The pits are dug in irregular lines across the field, thereby preventing soil erosion. When digging the pit, topsoil and sub-soil are separated. When filling in the pit, the topsoil and sub-soil is thoroughly mixed together with 20 litres of well-decomposed bocash manure or well-matured compost manure. Bocash manure consists of green leaves, animal droppings, ashes, maize bran and topsoil.

– I owe the miraculous harvests to the use of organic fertilisers and the planting of maize in pits.

Bocash, like any other manure, retains moisture and releases it slowly into the soil like a sponge, but it also makes soils stick together thereby improving the soil structure. This is especially advantageous to soils in drought-prone areas, as the soil moisture level is maintained and crops obtain their required nourishment.

When the maize seedlings are knee-high, Etrida top-dresses them using liquid manure. She makes this manure from droppings from poultry, goats, cattle and various other livestock. The animal droppings are transferred to available bottles, and water is added. The contents are shaken every day for 21 days, after which the liquid manure is of excellent quality and ready for use. The liquid manure is measured out over each maize seedling using a cup.

There is a clear difference between fields where organic fertilisers have been applied and fields where chemical fertilisers are used. Chemical fertilisers do not contribute to maintaining soil moisture levels, so fields in which chemical fertiliser has been applied generally have drier soil, resulting in a typically hard pan which contributes to transpiration and the subsequent wilting of crops.

Secure Food: As a result of her outstanding success, Etrida was unanimously elected to the position of 'Lead Farmer' by her village. Lead Farmer is a new concept that the Government of Malawi has adopted to recognise local farmers who have proven themselves to be outstanding and innovative in various agricultural technologies. A Lead Farmer is required to show aptitude and commitment for the task of teaching his or her peers.

Etrida explained that she is one of the busiest women in the whole of the Rumphi district as she has visitors who come from near and far to view her success – all the more impressive given that it has been achieved in a culture where women are generally considered inferior to men.

Today, Etrida is able to buy clothes and pay school fees for her five children. She has become highly admired for her newly-furnished house, with its new iron-sheet roofing; 80% of the houses in the village have grass thatched roofs.

Asked if she has any advice for her fellow farmers, Etrida urges them to organise themselves in clubs to share their knowledge and resources.

Etrida Luhanga received agricultural training through the FAIR Rural Livelihoods Programme, which is supported by Self Help Africa, Find Your Feet and The Development Fund, see pages 50-51.

Maize pit planting.

Farming For All Eventualities

Zambia's area is 752,618 square km and has a population of 11.9 million. 85% of the population is employed in the agricultural sector. The extreme poverty rate is 64%, and the literacy rate is 81%.

Approximately 95% of children are in school.

Despite economic growth over the last years, there is growing poverty in rural areas. The rainy season is between October and April. Zambia's main environmental problems are the erosion of agricultural lands and deforestation.

Beatrice Gona's fields are situated in the Chibombo district of Zambia. Beatrice's livelihood depends solely on farming, so the introduction of new farming methods to deal with climate change is vital for her family. She says these methods are proving to be reliable, but that it is important to follow a policy of mixed farming to cover all contingencies because climate change still poses a very real threat.

Beatrice Gona

Beatrice cares for 14 children: seven of these are her biological children, while the others are dependants. Three of her children have completed their secondary-school education, but the rest are still at school. This is a large family that requires a considerable amount of food to meet their requirements.

Drought, Flood and Hail: Asked about changes in weather patterns over the past 16 years, Beatrice says that the rains have changed both in intensity and distribution: "Way back in the 1980s, the rainfall pattern was so predictable that you knew the rains would always start in October and end in March of the following year. Nowadays, rains start later and stop earlier and during the rainy period there will be both prolonged dry spells and floods. Last season, for example, we had floods, but this year the rains have been largely normal, although towards the end of the season the rains turned heavy.

"In May, which is in the dry season, we had a hail storm. The hail stones left a trail of crop destruction because we were all caught off guard. We didn't expect such heavy rainfall at that time of the year," she says.

The changes in rainfall patterns are also affecting local rivers and streams: "In the past, the amount of water in the streams followed a set pattern through the year, but now they are either flooded or completely dry by the end of the rainy season."

Strategies to Reduce Total Crop Failure: Beatrice is a seed grower and she has adopted various strategies to reduce the possibility of total crop failure because of drought or flood. Among these are the production of various types and varieties of seed crops.

"In the past most farmers in Chibombo district used to plant only maize but now all farmers grow a variety of crops, and so I'm obliged to diversify accordingly to meet market demands," she says. "I have also diversified my own crops because of the growing uncertainty of achieving a successful harvest with only one type of crop each season. In addition to maize, I grow beans, cowpeas and soya beans in my fields. I also plant different varieties of each crop because then they all mature at different times and have different resistance levels to adverse conditions; some are better equipped to survive drought, while others are better in high moisture levels."

– I deliberately plant trees in the dry areas.

Nitrogen Fixing Trees: Beatrice believes that deforestation is one of the major contributing factors to the changes in the rainfall pattern: "I have first-hand experience of this. On several occasions I have experienced heavy rains in one area and, at the same time, a total absence of rain only a few kilometres away, even when these areas are in the same climatic region.

"I deliberately plant trees in the dry areas. There I make sure that I plant a tree every month. Some of them wither before they grow but that does not discourage me."

Among the other strategies Beatrice has implemented is the use of agro-forestry species, such as Sesbania Sesban, in her fields. She says these have helped improve both soil fertility and water-retention capacity in times of drought, and she plans to increase their use across her land.

Seed Bank: Beatrice says she gets a better crop yield from fields when she has used organic manure, specifically kraal manure, than she does when the fields have been fertilised with chemical fertilisers. She says she learned this from her parents and grandparents. Always searching for improvements, Beatrice also uses farming techniques such as crop rotation, intercropping and pot-holing in addition to her other adaptation strategies.

She is a member of three farmer organisations: the Chipeso Seed Grower Association, the Luchokolo Co-operative Farmers, and the Mikoka Gardeners Co-operatives. Together with other members of the Chipeso Seed Growers Association, and with support from Self Help Africa, she has established a community seed bank. The bank has been set up to ensure that the community has seeds to plant even in times of drought. If their own seed is ruined, the members can access seeds from this bank. To supplement the deposit of seed she has in the bank, Beatrice also keeps a seed store in a storage bin at home.

You can read more about Self Help Africa on page 50.

Beatrice Gona promotes agro-forestry to improve soil fertility.

Conclusion: Agricultural Methods

Mitigating Climate Change and Reducing Poverty

The most dramatic effect of climate change in Africa is the threat to food production. Agricultural production and food security (including access to food) in many African countries and regions are likely to be severely compromised by climate change and climate variability, according to the IPCC. The accounts you have just read leave little doubt that food and fodder production are already difficult in many parts of Africa.

However, the accounts also show that introducing new techniques can make farmers more resilient to climate change by improving harvests and diversifying produce. Mitigating climate change and reducing poverty are often two equally important results when introducing new agricultural methods.

Developing New Techniques

The new techniques being introduced are a combination of rediscovering traditional methods, developing new techniques locally and introducing new discoveries through agricultural experts. Perfecting these methods and adapting them to the continually changing climate will be an ongoing process, one in which African farmers will play a key role. The more organised and conscious this process is, the more efficient it will be.

Diversification

Climate change adds risks and increases vulnerabilities for rural communities. Measures which reduce vulnerability are the key to helping these communities to help themselves, and this calls for strategies tailored to each individual community. However, a common overarching theme is diversification. Diversification of crops and livestock reduces famers' vulnerability and gives them more options when adverse weather strikes.

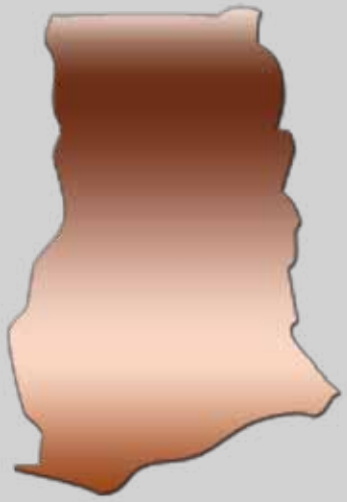
Ability to Adapt

In order to develop pioneering techniques and diversify their production, farmers require access to technology and know-how. In Malawi, Etrida Luhanga was shown how to grow maize in pits; Beatrice Gona in Zambia planted nitrogen-fixing trees to reduce the effects of deforestation; and, in Ethiopia, the villagers of Maygua received help in the construction of hand-pumped wells. People's ability to adapt depends on a variety of factors like education, social networks, economic resources, access to infrastructure and political stability. In Africa, illiteracy levels are still high among the adult population and three out of five of African farmers are subsistence farmers. Their farms barely produce enough for survival and there is little or no surplus to invest in tools, seed or fertilisers. External support is, therefore, often required to realise adaptation measures. Most importantly, as shown on the previous pages, agricultural adaptation is vital to ensure food security in farming communities.

Climate Adaptation: Knowledge and Education

accounts in this publication. Even so, these accounts also reveal the need for more information on how climate change will affect Africa. Up-to-date models on future weather changes across the continent are scarce, and there are even fewer models predicting changes at a local level. Accordingly, people's understanding of climate change and how it will affect their lives is limited (as in other parts of the world).

Increased knowledge is necessary to combat the effects of climate change. Equally important is education and training for new methods and adaptations. In the previous examples, people have taken on new agricultural methods, converted their stoves or dug their own wells. On the following pages, you will learn how increased knowledge and dissemination through teaching and training are important factors in climate adaptation measures.



Northern Ghana: Samson Batang (see page 20) and Tong Baloro live in Ghana's Upper East Region and Upper West Region, respectively. These two regions form the northern part of Ghana. The majority of the inhabitants here are subsistence smallholders with plots between 0.5 and 5 acres (0.2 – 2 hectares). Deforestation is a huge problem in northern Ghana and is causing severe soil erosion and land degradation. Northern Ghana has one rainy season from May/June to September/October, with drought lasting for six to seven months a year. The harvest seldom provides enough food for more than five months. Families survive by rationing their food and finding seasonal work in other parts of the country.

You will find a general introduction to Ghana on page 20.

Farmer-to-Farmer Education

Tong Baloro lives in the farming community of Lambusie in northern Ghana. He is involved in initiatives to inform local farmers about the causes of climate change, to organise collective action to tackle the problems that result from it and, as far as possible, to protect their natural resources. Tong believes: "Education is the only way we can enable our people to cope with the worsening environmental conditions."

Thirty years ago, Lambusie was the second largest area of maize production in the region and benefited from a plentiful forest reserve in addition to fertile soils. Today, Lambusie has changed radically. Most of the young adults are either migrating or engaged in activities such as charcoal burning and felling trees for sale as firewood, which increase the problems of climate change.

Rapid and Extensive Change: Tong is appalled by the enormity of the changes he sees around him: "I cannot believe this is happening in my lifetime; I remember the conditions when my father started his first farm in 1969. The land was so fertile that some maize plants had two cobs on the same plant. Rainfall was sufficient, and the start of the various seasons could be predicted with certainty by local forecasters.

"There was little flooding as water flowed naturally along established watercourses. Natural ponds provided water for large herds of livestock, for use in gardening and for domestic consumption. Respect for religious monuments and shrines contributed to the preservation of vegetation, because farming or felling trees was forbidden in the vicinity of such sacred places.

Tong Baloro is promoting several environmental and climate change projects among his fellow farmers in northern Ghana.

"Today everything has changed," he says. "Seasons are no longer predictable. The seasonal cycle is characterised by floods and droughts, the erosion of topsoil, the disappearance of ponds and the destruction of forest land, all of which have an adverse effect on wildlife."

According to Tong, the rains every year over the last two decades have been consistently less than in the previous year and the harvests have been proportionally smaller. On the other hand the population is on the increase.

"In years past, sowing in June was considered late, but now June is the start of the sowing season. As a result, many people eat only one meal a day for long periods of the year, there is less variety of food, and people's health is deteriorating. This has a negative impact on productivity.

"As a result of this year's poor and unpredictable rainfall, we have sown three times with no

– We have sown three times with no positive results to show for it, and the farmers have run out of seed.

positive results to show for it, and the farmers have run out of seed," says Tong.

A Circle of Destruction: "The loss of forest means we must travel far to find timber to roof our homes, there is no more game to provide food for our children, and there has been an increase in the windstorms that destroy our homes, schools and crops. Today children have to go the Zoo in Kumasi to see the monkeys and elephants that used to be very common here.

"The lack of vegetative cover has resulted in extensive erosion. The poor soil demands costly soil supplements like fertilisers that most farmers cannot afford. Thus we are forced to borrow, and whatever we make is used to repay the loans rather than providing adequate food for our children.

"As a result of agricultural activities along the river involving the use of tractors, waterways fill up with soil thereby reducing their capacity to hold enough water to feed the livestock. The cattle therefore stray over large distances in search of water and are frequently stolen. The consequence is not only a loss of capital; it also causes a shortage of manure for the farms and for plastering home walls."

Information and Action: In Lambusie, everyone agrees that climate change is making their farming efforts difficult. Tong has therefore been able to persuade some farmers, though not all, to use only bullock ploughs which cost less and do not cut as deeply into the soil as tractors. Tong is also working with one group of farmers to plant teak to be used in the roofing of houses. Tree planting will also be carried out along waterways to reduce the erosion of soil and protect the water reserves.

With the support of Concern Universal and their local partner Pronet, Tong has initiated a training system with emphasis on farmer-to-farmer training. He works with some 20 women to cultivate nurseries where different species of trees are grown. Groups, institutions and individuals can buy trees for planting, thereby increasing forest reserves.

Following the 2007 floods, the nursery provided over 20,000 seedlings to support tree planting in 25 communities in five districts in the north of Ghana.

You can read more about Pronet and Concern Universal and their work in Africa on pages 50-51.

A Better Future for Children

Pastoralism: Since ancient times, pastoralists have utilised dry, marginalised land. They derive their food and livelihood from herds consisting of cattle, goats, sheep, and camels. Their main diet is milk and meat. Pastoralists practice a mobility pattern, where they are constantly or partly on the move with their animals searching for animal grazing.

In the Horn of Africa, many of the more fertile pastoralist areas are being taken over by plantations or local farmers, moving the pastoralists to more barren areas. As we have seen, many pastoralists also feel that there is no future in pastoralism under the current climatic conditions. However, it is important to continue to facilitate the unique flexibility of pastoral systems. This mobility pattern allows millions of pastoralists to sustain a livelihood in areas where no one else can live. Even though their scarce resources make pastoralists especially vulnerable to climate change, their flexibility has also allowed them to cope with climate variability for centuries.

You can read about Ethiopia and Afar on pages 12 and 14.

Climate change has made pastoralist life extremely difficult in the Afar region of Ethiopia. In the settlement of Hotenmero, they hope that schooling will allow the younger generation to choose alternative livelihoods.

Hotenmero consists of little more than a few scattered wood huts, most in the traditional dome shape favoured by the inhabitants of the region. The only buildings that catch the eye of an outsider are the new health clinic funded by UNICEF and a dilapidated school building with gaping holes in its wooden walls and, on closer inspection, rickety benches that appear to be on the point of collapse.

Schoolteachers Aster Berhuni (left) and Fantanesh Birudet (right) with pupils Habahaba and Mohammed Debuka

Problems Everywhere: 60-year-old pastoralist, Enamea Bela, is a relatively affluent farmer: "I have one wife and 11 children aged from 8 to 40. I own 20 camels, 30 cattle and 50 sheep and goats. The environmental situation is very severe for pastoralists. It is getting hotter and hotter and rainfall is decreasing every year.

"I have to walk very long distances. I eat breakfast at 6 am, take a container of water, and have nothing else to eat before returning home in the afternoon. I walk some 25 kilometres before returning home sometime between 2 and 3 pm.

"There has been a huge change over the last 20 years. There is no food, no milk; there is too much suffering. There are problems everywhere."

Belief in Education: While some of Hotenmero's residents have turned to small-time trading in the hope of escaping poverty and malnutrition, Enamea's 13-year-old son, Habahaba, attends the school that has recently opened in the area. Habahaba is enthusiastic about school: "Education is a very nice thing. My favourite subject is Amharic. It is good to learn another language. When I grow up I don't want to be a pastoralist, I want to drive a car for a living. The life of a pastoralist is not attractive. I want to live my own life."

His father endorses his son's hopes: "I am pleased about his education. An educated person can do all the things in the world. I will support my son as much as I can, but I do not have the resources to keep him at school beyond the fourth grade."

– I am pleased about his education. An educated person can do all the things in the world.

Establishing Alternative Means of Existence: he two school teachers, Aster Berhuni, 32, and Fantanesh Birudet, 30, arrived in Hotenmero a couple of years ago: "Although we have not been here very long, we have already experienced an increase in temperature and, as a result, there is also less vegetation for the animals to feed on," says Fantanesh. "People are compelled to move around with their animals to survive. Driving around in trucks in the intense heat taxes the health of the young and old, and occasionally causes the death of infants.

"Last year there was no rain for ten consecutive months; from September to June. This year we had some rain in September and October, but after that there has been no rain at all. There is no seasonal pattern any more. When rain does fall it is erratic; it will just suddenly come. Pastoralists do not need much rain but, even if there is some, it evaporates and percolates very quickly," Fantanesh adds.

Having come from an urban environment, both teachers were shocked by the insecurity of the living conditions they encountered and are relieved that the community is working hard to establish alternative means of existence. "Most of the Muslim families in this region are pastoralists, but some are starting to irrigate land for farming," says Aster. "Farming is better than pastoralism in some areas. A mixture is good. Then they can grow fodder for their animals and at the same time improve their income. If they receive aid in the form of seeds and finance, they are very keen to change. The pastoralist lifestyle is tedious. They travel in order to find a minimum of fodder and water."

A Nomadic Lifestyle Interferes With Education: Of most interest to the teachers is their school and the effect it is having on children like Habahaba: "We are trying to teach all the students Amharic, maths, geography and English. There are three teachers and 45 children aged from 9 to 14. The effect of the education is not yet that obvious, as it has not been available for very long. We hope the education will give the children basic skills and give them the opportunity of further education, possibly university. There is hope for their future."

The teachers are concerned about the lack of equipment and facilities. Another of their concerns is non-attendance of students: "Although some in the community are not interested, the majority would like to send their children to school. One of the issues is the nomadic nature of the pastoralist lifestyle. The children will start school here, but when their parents move, the children will naturally accompany them. If there was a possibility to provide food and housing, the children could live here even if their families moved," says Aster.

Enamea Bela with his son, Habahaba

Malawi has two seasons: a rainy season from November to May, and a dry season from May to November. The country has often been subject to drought and extreme flooding.

85% of the population live in rural areas and Malawi's economy is largely agrarian with over 90% of the population depending on agriculture for their livelihood. More than one third of Malawi's GDP, and 90% of export revenues, stem from the agricultural sector. Maize is the main staple crop, while tobacco, tea and sugar are the key cash crops.

You will find a general introduction to Malawi on page 30.

Information and Advocacy

The Centre for Environmental Policy and Advocacy (CEPA) in Malawi works as an advocacy institution, lobbying for environmental legislation and national policies on climate change and disaster risk reduction. Equally important is CEPA's work in different sectors of civil society to heighten awareness of the causes and impacts of climate change, and of climate change adaptation strategies.

A crucial part of CEPA's lobbying work is conveying the experiences of local communities to government bodies: how are communities being affected by climate change, and what lessons have they learnt through adapting to the changing conditions? By answering these questions, they hope to encourage policy makers to provide necessary support to the communities affected by – and adapting to – climate change.

Increasing Problems Require Action on a National Level: William Chadza, CEPA's executive director, has visited villages all over Malawi and seen the effects and consequences of changing weather patterns: "Local organisations are initiating and organising many effective measures in response to the changing climate, but growing environmental problems are constraining these efforts," he says.

The most obvious effect of climate change in Malawi is the increased frequency of floods and droughts. There are also obvious changes in rainfall patterns. "In January 2008, the village of Magana in Salima district on the shores of Lake Malawi was struck by a flood that destroyed most of the newly planted crops," says William. "After the flood receded, new crops were planted but these crops never matured, because the rainy season stopped very early. Even after climate changes had started negatively affecting food production, many areas could rely on the dimba gardens [low-lying land areas which gather moisture and therefore are good for gardening in the dry season] to produce some food. Now, in some areas like the lower Shire, even the dimba gardens are not moist enough for crops to mature in the dry periods.

Four men from the village of Magana on the shores of Lake Malawi, one of the villages where CEPA works.

"If we wish to do more than just adapt to the changes, if we are to take preventive actions to reduce the effects of climate change in the long run, we need a national policy, national coordination and higher compliance to environmental legislation. A national policy would

– I think policy makers from the North have a lot of influence in terms of outcomes from international negotiations.

Gracien Banda (left) and William Chadza (right) from CEPA.

make it easier to regulate and implement climate change actions at national, district and local levels."

Interconnected Problems: CEPA is concerned that the effects of climate change are being accelerated by the unsustainable exploitation of Malawi's natural resources: "Our thinking is that, if there is sustainable management of natural resources, to a certain extent, the most serious and immediate effects of climate change can be prevented. For example, if we are able to maintain enough trees and vegetation to check running water from heavy rains, the consequences of flooding will be less devastating and probably affect smaller areas.

"Poverty is another serious hindrance to the implementation of adaptation measures locally.

Lack of education, malnutrition, and lack of economic resources all limit people's ability to find and put into effect new technology and methods. It is important that this factor is addressed as a part of the overall strategy of dealing with climate change."

Building a Stronger Environmental Movement: In Malawi, environmental movements are still in the early stages of development. "We notice that civil society organisations in general have only been working together on an ad hoc basis to address a specific and urgent issue. Now there are some efforts to exchange information and views on a more regular basis in order to strengthen their ability to influence public opinion and policy making."

According to William, one of the major challenges is going to be lobbying for finances for climate change adaptation, both nationally and at the international level. "I think that policy makers from the North have a lot of influence in terms of outcomes from international negotiations. As they negotiate they should make sure that the outcomes and agreements

Fishing boats and fishermen on Lake Malawi.

that are made take into account the interest of communities in least developed countries who are being affected by climate change.

"Most of the results of climate change management interventions are likely to come in the long term rather than short term. Most development partners are unlikely to be willing to fund projects where the return is on a long-term basis, although these are the projects likely to be more sustainable. In dealing with climate change, I don't think short-term efforts will be able to address the problems."

You can read more about CEPA on page 51.

Conclusion: Knowledge and Education

Education Increases Adaptation Efficiency

By understanding what is happening to the climate, African farmers can take more proactive and informed decisions on how to act when their conditions change. The more conscious and organised the implementation of adaptation measures is, the faster new knowledge will be gained and further progress accomplished. Thus, enabling farmers to access and share information on climate change and adaptation is vital.

Farmer-to-Farmer Education

These accounts highlight the role of local communities and small organisations in teaching and training for climate adaptation. Local knowledge is an irreplaceable resource and an important basis for learning. Involving local people in decision-making processes in a participatory way allows for a more holistic approach and ensures local communities are more in charge of their own lives. A combination of farmers learning from other farmers (Lead Farmers) and professional training by agricultural experts is the ideal approach. Institutions for training are also necessary, whether these are local projects, cooperatives, government initiatives or donor-driven programmes.

Both Ways

African governments have a natural role in sharing knowledge about climate change. While the government should provide training, it also needs to learn from the experiences of its people. Climate change is a global challenge, and people on the frontline of climate change need to hold their governments responsible for putting adaptation strategies in place. Environmental groups have an important role to play in organising people and bringing their opinions and experiences back to the government.

Analysis: Climate Adaptation – The Way Forward

The different voices in this publication all speak of a common threat, climate change, and a common aim, to adapt. This section of the publication summarises the experiences of these people on the frontline of climate change and suggests ways in which changes in policy could help them.

As the many witness accounts on the previous pages have shown, the impacts of climate change on communities in Africa are harsh and are already being experienced. These impacts, caused by greenhouse gases, which have a warming effect on the Earth, are due to the actions taken over the last centuries by humans all over the world – but particularly in the more industrialised nations. **The least developed countries (LDCs),** Small Island Developing States (SIDS) **and Africa** (not including South Africa) **only account for 3,2 % of global emissions, but these nations will be the worst affected by climate change** – over half of the world's 100 nations most vulnerable to climate change can be found in Africa.[1] It is therefore important to consider the stories of these individuals and communities when faced with decisions about **adaptation methods** as the vulnerabilities of people at a local level are often left out of these processes.

The **effects of climate change can be split into two categories: environmental and socio-economic,** where many of the latter occur as a result of the former. Environmental effects include changes in rainfall patterns, increased frequency and severity of floods, droughts, storms and heat waves, changes in growing seasons and regions, changes in water quality and quantity, sea level rise and glacial melt. These impacts touch on every part of life in the countries most affected. These environmental impacts do not have the same socio-economic consequences in every location. In Kenya, Mwikali Kiteme talks about the famine that occurred as a result of a reduction in rainfall and in Ethiopia this same impact has caused erosion in dry mountainous areas (pages 12-16). Disease is closely linked to climate and therefore changes in the weather bring unexpected illness, which communities are not prepared to deal with as Haisemma Dellihu from Ethiopia discussed (page 14). In Ghana soil fertility has deteriorated as a result of heat waves leading to a reduction in agricultural productivity, which accounts for 70 % of regional

1 Saleemul Huq and Jessica Ayers (2007). Critical list: the 100 nations most vulnerable to climate change. Sustainable Development Opinion. The International Institute of Environment and Development.

The extent of soil erosion, caused by baking sun and torrential rain, is graphically illustrated by this picture from Oromia, Ethiopia.

Tree seedlings being reared in a nursery in Uganda.

employment in Sub-Saharan Africa[2]. The case studies also show numerous examples of infrastructure damage and destruction as a result of excessive rainfall, leaving communities in absolute poverty, as well as leading to a loss of animal and human life.

Of course, there are many features that make particular people or places vulnerable to the effects of climate change. Areas may be vulnerable due to the nature of the land, for example if it is low-lying, or due to socio-economic reasons such as insufficient infrastructure, malnutrition and a lack of education. **There are also some members of society who are more vulnerable than others.** Poverty on an individual and community level challenges the way that people are affected by change and disaster. The rate of poverty in Sub-Saharan Africa is 50 %[3] and the continent has the largest prevalence of undernourishment relative to its population size (32 %)[4]. When this is the foundation for the impacts discussed above it is no wonder that communities struggle to find ways in which they are able to adapt to the increasing effects of climate change. Those who are dependent on natural resources are also particularly vulnerable, especially as **90% of agriculture is based on rain-fed crops**.[5] Furthermore, slum dwellers who live on unauthorised land frequently lack infrastructure and are often settled in flood plains, leaving them prone to the worst effects of flooding.

The vulnerabilities also depend on the level of urbanisation. Africa's population is becoming increasingly urbanised, and the urban lives and livelihoods are vulnerable to different kinds of climatic changes and hazards – strongly influenced by the provision of infrastructure and services. Within rural communities, the young are more at risk from diseases and women bear a disproportionate burden in the collection of water.

The accounts in this publication show that **policy-makers need a more detailed and engaged awareness of the varying and complex nature of vulnerability**. Not all people are equally vulnerable, and **effective adaptation responses need to take into account the specific needs of particular groups**. The post-2012 agreement must more effectively support community-based adaptation as part of an effective, pro-poor global climate change response.

How are Individuals and Communities Already Adapting?

The experiences of the men, women and children discussed in this publication show that they are **already deeply engaged in the process of adaptation to climate change** – although they cannot meet these challenges single-handedly. People and communities are active and effective agents of change – they are aware of the big issues affecting their lives and livelihoods and of the immediate steps they can take to address these. However, taking these steps requires support. Often, this will be financial support – after all, these individuals are living in some of the poorest parts of the world. The absence of reliable estimates for these costs is impeding development efforts. At the same time, **transferring knowledge, technical capacity and experience is equally important** to generating long-term and sustainable solutions.

As shown by the accounts in this report, **people and communities are active agents of change** in addressing the issues that affect them directly and indirectly. **Community-based adaptation** is increasingly recognised as a key way for the world's poorest and most vulnerable people to build capacity to cope with the impacts of climate change. All of the accounts in this publication are evidence of the ingenuity of local people and their ability to initiate projects and to share knowledge. This was shown, for example, in the story "Miraculous Harvests in a Starvation Area" (page 30) where farmers have been teaching their peers about methods they have used which have been successful. The Lead Farmer in this case gives knowledge sharing as her main piece of advice for other communities. The

2 Parliamentary Office of Science and Technology (October 2006). Adapting to climate change in developing countries. POSTNOTE 269. London.

3 Shaohua Chen and Martin Ravallion (2008) The Developing World Is Poorer Than We Thought, But No Less Successful in the Fight against Poverty. Policy Research Working Paper 4703. The World Bank.

4 More people than ever are victims of hunger (June 2009). Food and Agriculture Organisation of the United Nations.

5 Parliamentary Office of Science and Technology (October 2006). Adapting to climate change in developing countries. POSTNOTE 269. London.

This group at Fendisha in Ethiopia's Eastern Highlands have constructed dam walls, gulley restoration work, and undertaken an extensive tree planting programme to restore the water table and rehabilitate more than 20 hectares of farmland in their area.

final section of this publication on Knowledge and Education, gives further examples and evidence for the potential of community led projects and participatory approaches.

Of course, all the efforts placed on adaptation will **be futile if there is not an effective global response to limit greenhouse gas emissions** and prevent the most dangerous effects of climate change from occurring. In the case of deforestation, communities are seen to be coming together to help with the global efforts towards mitigation and at the same time benefiting from the change in micro-climate which results from the planting of vegetation. **But they cannot achieve adaptation without appropriate support** and there is a need for technical, knowledge and financial frameworks to initiate new programmes. However the support for local communities must be carefully managed. It has been shown that communities are successful in establishing their own agenda and it is therefore **vital to give communities the space in which they can build their own capacity**. There are examples throughout this report of the difference that a small amount of external support can make whether in the form of training or finance. In Tigray, Ethiopia, the provision of financial and technical advice from REST helped a farming family to build a dam (page 12). A different group of villagers in Ethiopia had no farming experience but with teaching from FARM-Africa they now have the capacity to generate income and pass the knowledge onto their children (page 14).

Education is often also necessary to inform communities that the changes in climate will continue to occur and that there is a need to adapt for the long term. Without access to information and adaptation funds, vulnerable communities and groups may continue to rely on short-term coping mechanisms that are more damaging in the long run. This support needs financial backing and must be considered within a renewed commitment to adaptation.

Financing adaptation therefore requires realistic costings supported by detailed financial information. Recent discussions by leading members of the Intergovernmental Panel on Climate Change (IPCC) suggest that the global estimates for adaptation costs are two to three times too low.[6] It is important that a serious post-Kyoto agreement includes a mechanism by which realistic costs for adaptation can be obtained in order to form a basis upon which funding can be allocated to community-led adaptation projects.

Some of the projects in this report did not require a huge financial input; rather they relied on **networks of knowledge and influence**. In fact community led schemes generally require less money than government or larger NGO-run projects. A wide range of experiences from around the world **clearly shows that relatively small amounts of financing, targeted precisely at vulnerable groups** who are motivated to address challenges themselves, can be the most effective way of creating long-lasting change. The willingness of local participants to support activities with their own labour, their desire to see improvements in their own surroundings, and their experience of addressing difficult issues with limited financial resources all contribute to the huge impacts that can be realised with relatively small investments.

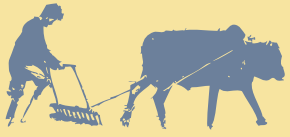
In Ghana, the key intervention to protect forests and soil fertility in the Gare area was training individuals to prepare compost manure, construct stone bunds, and establish tree nurseries (page 36). Teaching people in this way generates longer-term solutions, which may even have future revenue benefits and which lessen the reliance of communities on external support.

What Other Issues Require Attention?

Climate change, poverty reduction, and resilience to shocks and stresses are very closely related. Developing countries face both the need to adapt to climate change and the need to develop**,** but "addressing many of the obstacles to development…will become much harder and more costly [with climate change]"[7]. It is therefore important to not lose

6 Martin Parry et al (2009) Assessing the Costs of Adaptation to Climate Change: A Review of the UNFCCC and Other Recent Estimates, International Institute for Environment and Development and Grantham Institute for Climate Change, London.

7 Stern, Nicholas (2009). A Blueprint for a Safer Planet, The Bodley Head, London



focus on development but to "see the issues of economic development and of climate change as parts of a whole"[8]. This also allows for the financing of climate change adaptation through development projects.

Resilience, is an important concept in this discussion, being seen as both contributing to sustainability and reducing vulnerability. Resilience is often taken to mean the ability to respond to shocks and stresses and to return to a pre-existing state. But it is important to view resilience in a wider context, which also addresses the myriad challenges that constrain lives and livelihoods. It therefore needs to take into account a wide range of economic, social, psychological, physical and environmental factors that are necessary for humans to survive and thrive.[9] Resilience to climate change requires human systems which do not exceed the capabilities of the natural system and natural systems that are not threatened by human systems. Resilience is also dependent on people's access to rights, resources and assets which in turn relies on good governance. Being truly resilient to a changing climate involves not just changing crops according to previous weather conditions but being able to recognise indicators which help predict the beginning and end of the rains by changes in temperature and behaviour of animals and plants, therefore increasing community capacity and independence.

Strengthening the capacity of local communities to engage in policy debates and shape governance decisions is an important component of adaptation, as many developing countries have political structures that have limited or no accountability to their citizens – especially the lower-income groups who are most vulnerable to most external stressors. Many have governments that actually increase the vulnerability of most of their lower-income citizens. In the case of a weak government with little resources there is a need for strong support for local private providers and community provision within a long-term goal of supporting more competent, accountable and transparent local governments. Where there is an accountable government with poor resources, the focus should be on capacity building and support for its partnerships with civil society.[10] It is important not only to fund adaptation projects at a community level but also to assist communities in engaging in policy debates and power relationships. Therefore, there is a need for country-led processes in which **communities themselves are able to promote their own agendas** and their capacity to act is strengthened.

There are times when adaptation methods that are designed to reduce vulnerability to climate change instead end up aggravating the situation, sometimes resulting in effects as serious as those they were designed to avoid. **This situation of maladaptation needs to be avoided.** The extent of maladaptation can range from simply shifting the vulnerability from one group to another, to shifting the vulnerability between generations. It is necessary to consider non-climate related side-effects of systems put in place such as issues of equity and social acceptability. These issues should be addressed before new methods of adaptation are implemented.

We can learn a lot from the stories of these people, which represent a huge range of problems and solutions occurring across the African continent. We must understand that these cases do not exist in isolation, but that climate change is having serious impacts on human lives, particularly across Africa, and often the people worst affected are also in the worst place to be able to cope. **Enhanced action is needed on adaptation**. These men, women and children are willing and often able to do all they can to adapt their homes and livelihoods to the increasing effects of a changing climate and we must pay serious attention to local knowledge and experience in everything that is done in this area. Of course **financial input is crucial**, and with a renewed commitment in this area and an understanding of the link between adaptation and the existing poverty reduction efforts it is possible to protect people from the worst of the effects. ■■

8 Stern, Nicholas (2009). A Blueprint for a Safer Planet, The Bodley Head, London

9 David Dodman, Jessica Ayers and Saleemul Huq (2009). Building Resilience. Chapter 5, 'State of the World 2009'. The Worldwatch Institute.

10 David Satterthwaite, Saleemul Huq, Mark Pelling, Hannah Reid and Patricia Romero Lankao (October 2007). Adapting to Climate Change in Urban Areas: The possibilities and constraints in low- and middle-income nations. IIED, London.

Rain harvesting ponds using road and hillside run off are being promoted in Ethiopia as a way of ensuring that small-holding farmers can have a year around supply of water to irrigate their land.

Organisations on the Frontline of Climate Adaptation

The following organisations are all helping communities in rural Africa to improve their lives and livelihoods and create secure futures for their children through the implementation of community-led, livelihoods-focused initiatives that sustainably reduce poverty. The organisations know from their experience that climate change is already adversely affecting some of the world's most vulnerable communities, but that with appropriate policies and well-directed help, those communities have the resourcefulness to adapt.

Concern Universal works in partnership to challenge poverty and inequality, supporting practical actions that enable people to improve their lives and shape their own futures. We work in 12 countries worldwide to improve food security and support sustainable livelihoods; improve health, respect for rights, and skills; and reduce vulnerability. www.concernuniversal.org

The Development Fund is a Norwegian independent environmental and development organisation. Our priority is to support poor people in rural areas of developing countries in their own efforts to free themselves from poverty and in securing the environment. At the same time The Development Fund also works on changing the political and economic conditions that create and maintain poverty and destroy the environment. www.utviklingsfondet.no

FARM-Africa transforms the lives of poor rural people in Africa. Our work of nearly 25 years has proved that with just a little assistance, Africa's farmers can dramatically improve their lives. We work in Ethiopia, Kenya, Tanzania, Uganda and Southern Sudan. Through grassroots projects we help rural communities to grow more food; keep their livestock healthy and manage their natural resources sustainably. www.farmafrica.org.uk

Find Your Feet (FYF) believes in social justice: a world in which everyone has the right to build a future free from poverty. It works with the rural poor, using their own skills and knowledge to develop sustainable solutions to poverty. Based on their ongoing experience in South Asia and Southern Africa, FYF informs and influences global debates on development. www.fyf.org.uk

Self Help Africa provides practical support to rural communities in Sub-Saharan Africa. We work together to increase food security and diversify livelihoods in ways that are sustainable, enabling families to achieve a lasting positive change in their lives. www.selfhelpafrica.com

FARM Africa
Making a lasting difference to Africa's families

FIND YOUR FEET

UTVIKLINGSFONDET
THE DEVELOPMENT FUND • EL FONDO DE DESARROLLO

The following African organisations have been presented in this publication:

Centre for Environmental Policy and Advocacy (CEPA) is a Malawian NGO which seeks to contribute to the development of environment and natural resources management best practices in Malawi and the Southern Africa Region. As a think tank organisation, CEPA provides advice and conducts research in environment and natural resources management policies and legislation with a view to designing appropriate interventions for promoting sustainable environment and natural resources management. CEPA is a partner of FAIR.

FAIR is a joint Rural Livelihood Programme financed and implemented jointly in Malawi by Self Help Africa, Find Your Feet and The Development Fund. FAIR partners work collaboratively towards reducing poverty and improving livelihoods in Malawi, through sustainable community-based initiatives.

Mitamisyi Poverty Alleviation Programme (MPAP) is a local NGO working in Kyuso District, Eastern Province, Kenya. MPAP supports communities to develop themselves through access to clean water, improving agricultural production, capacity strengthening and peace building.

Njawara Agricultural Training Centre (NATC) is a community initiated and owned organisation, based in the North Bank Region of the Gambia. It works in partnership with both local and international institutions in training youths and adult farmers on sustainable farming systems with a view to creating self reliance and employment, thereby reducing poverty and rural-urban migration.

PRONET (Professional Network North) is a local NGO based in the Upper West Region of Ghana. It specialises in community development through partnership using rural water and sanitation as a rallying point. PRONET is also involved in training and institutional strengthening, empowerment of women, microfinance, social accountability and advocacy.

The Relief Society of Tigray (REST) is an Ethiopian NGO implementing a wide range of relief, rehabilitation and development activities in the National Regional State of Tigray. Originally established to serve the needs of the people in the liberated areas of Tigray during the then civil war, REST has always been a grassroots organisation, committed to working with the poorest and most marginalised communities to bring about positive and sustainable change.

TRAX Ghana is a local NGO in Upper East and Northern Regions of Ghana. TRAX Ghana works with rural communities to enable them to work their way out of poverty through improved agriculture and new skills in income generation.

Concern Universal

Self Help Africa

Climate Frontline – African Communities Adapting to Survive

In *Climate Frontline*, African women and men describe, in their own words, how climate change is affecting their lives and how they are adapting to survive. These communities are not only living with climate change, they are implementing strategies in order to adapt to the changing conditions. Governments and international bodies should recognise that these communities have experiences that can help reduce negative impacts of climate change.

The NGOs behind *Climate Frontline* believe that actions to tackle climate change must start by listening to and supporting communities living on the climate frontline. We hope *Climate Frontline* can contribute to sufficient and reliable climate change adaptation support for these communities.