Adapting to Climate Change

gtz Climate Protection Programme

commissioned by

Federal Ministry
for Economic Cooperation
and Development

Practical perspectives

Facts

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Benedikt Haerlin
Britta Heine (GTZ)

Preface

The impacts of climate change are plain to see - already today - for those who look. They hit poor countries and their people particularly hard, putting their development at risk. This is why German development co-operation attaches great importance to both "mitigating" the causes of climate change and "adapting" to present and future climate change impacts.

The German Federal Ministry for Economic Cooperation and Development is already supporting many and diverse activities in the field of mitigation. This work ranges from improving energy efficiency, fostering renewable energy and preventing deforestation to building capacity for emissions trading. In the field of adaptation we are still at an early stage. Our aim is to move from concept to practice in helping developing countries set priorities for action and cooperate in their implementation. This work is currently gaining momentum internationally and will be a priority for German development assistance in coming years.

Moving from theory to practice means understanding how poor people's livelihoods are actually affected by climate change. On the following pages individuals in Africa, Latin America and Asia tell us about climate change and how it affects their lives. They also share with us their strategies to deal with existing and anticipated changes. By telling their stories we want to show that adaptation is about real impacts for real people and that we are committed to making a tangible difference, working together to meet the adaptation challenge.

Dr. Manfred Konukiewitz,
Commissioner for Climate Policy

Federal Ministry for Economic Cooperation
and Development

How to adapt to the uncertain?

It has taken the global community a long time to accept that we are rushing towards dramatic climate change and are about to face massive impacts on hundreds of millions of livelihoods around the world. Today this fact is widely understood and so is the need to mitigate further acceleration and aggravation of the human impact on climate.

We have also come to understand and accept that adaptation to the already existing level of climate change is an urgent issue, demanding our attention as much as the prevention of further global warming. Adaptation to climate variability is not a new concern for environment and development specialists. But due to the predicted dimensions of climate change it is becoming a crucial factor in planning and prioritising almost all fields of mid- and long-term governmental and private sector activity. Fewer and fewer decisions in real estate, agriculture and food production, energy and infrastructure, rural and urban development and in transport or service development can still ignore the question: "How will climate change directly and indirectly affect the viability of this investment?" Many finance, insurance and real estate companies are therefore starting to incorporate climate change risks and opportunities into their decision-making. Public organisations and also businesses are well advised to follow suit. In practice, two important tools are needed: the best available impact assessments and the best available vulnerability analyses. These analyses and assessments tell us whether and how change occurs, where it will strike and who will be hit hardest.

Climate-related effects constitute a threat to the development of poor countries and particularly to impoverished groups within a population. The relevance of climate change to development cooperation is clear: without consideration of these effects and without strategies for adaptation to these effects, the United Nations Millennium Development Goals will be much harder to achieve.

Uncertainty is no reason to wait

What exactly are the current and future impacts of global warming? Over the past decade, the body of knowledge about how the Earth System functions has grown substantially. Scientific assessments have predicted dramatic scenarios with growing confidence. Yet these scenarios are conservative, cautiously foreseeing average changes over longer periods. Scientists cannot anticipate concrete weather conditions for a given crop season, nor can they deliver reliable forecasts for upcoming cyclone and hurricane seasons. While we know e.g. that droughts, hurricanes or floods will intensify in certain regions we do not know exactly when, where and how they will occur. Uncertainty mounts from the global to the regional level, and rises yet further at local level.

Clearly, the first step to take at this point is to raise awareness and preparedness both with regard to disaster prevention and with respect to the most vulnerable sectors. These are frequently agriculture, forestry, fisheries and construction as well as water management, and the management of coastal zones and arid regions. Experience with climate variability can often be a good starting point for adaptation. In many cases tackling eco-destructive management practices such as deforestation, inappropriate irrigation and other forms of resource depletion is a critical step that will also have beneficial impacts on overall living conditions.

Another important principle to follow under the current conditions is: "Do not put all your eggs in one basket". One of the best and oldest agricultural strategies to deal with uncertainties of weather is to diversify cultivation in order to minimise the likelihood of total failure, even though this means it is not possible to aim for maximum yield under one particular set of conditions. Similar strategies of diversification can be used in other areas of land and resource management. Risk management and microfinance instruments can further contribute to strategies for coping with the effects of climate change.

Nothing new under the sun

In a historical perspective, changing climate conditions are no new phenomenon, although events related to climate change may not have occurred as frequently and dramatically as we will witness over the coming decades. Societies have always attempted to adapt to them – with varying degrees of success. Therefore many activities considered adaptation to climate change are not new: e.g. risk management, coastal management and spatial planning. In some regions, the repercussions of climate change will be unknown phenomena to these regions, while the same events may be well known in other regions. These latter regions will have developed experience and traditions to cope with these conditions. It is essential that we learn from such regions and their historic experience – this is an important part of adaptation and does not need to be invented: it is already there and "just" needs to be applied.

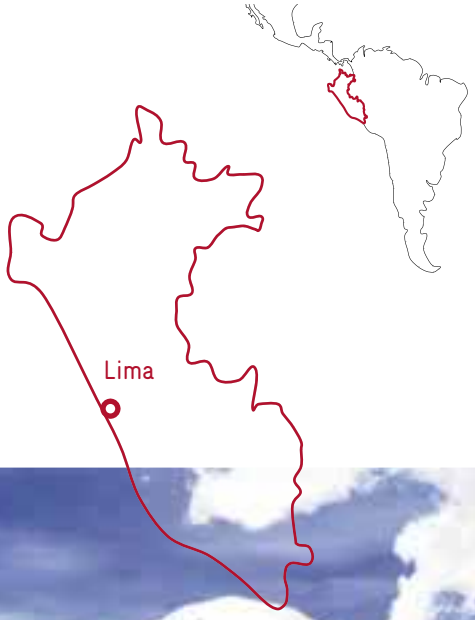
What is the role of Development Cooperation?

Development cooperation can play its part by providing the resources for adaptation to climate change for countries which lack the means to address it. Practical support to make adaptation happen and put concepts into action is important. Getting the priorities right is a crucial part of this effort. Development cooperation can assist in:

- *Understanding regional and local climate impacts*
- *Assessing the social and economic vulnerabilities of a population*
- *Setting priorities for action, far beyond the reach of environment ministries, including all branches of government, non-governmental organisations, and civil society*
- *Implementing priority measures in specific sectors*
- *Integrating climate concerns in all areas of decision-making and planning*

This brochure provides examples of men and women affected by the initial signs of climate change. They have started to use their imagination and are preparing to adapt to climate change. These stories provide diverse perspectives from different regions of the world. They stand for thousands of initiatives and individual approaches. Diversity and collective efforts, use of best available knowledge and practice, the will to face the problem, also involving trial and error, and joint preparedness for change and responsibility is all that we have.

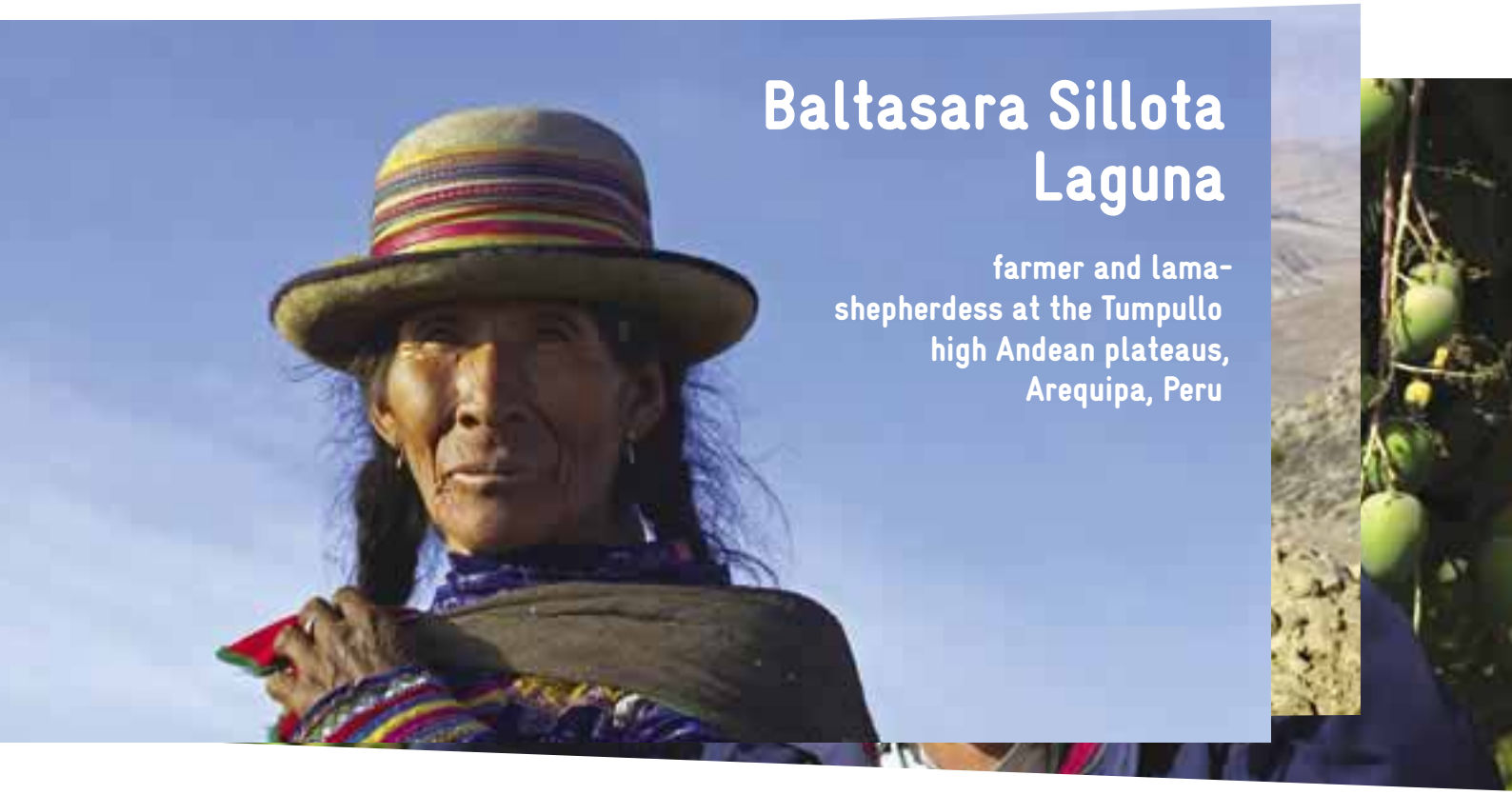
Peru



Project Profile: Peru

Project name:	Adaptation to climate change through integrated watershed management and integration of climate risk aspects in planning processes in two departments
Partners:	Regional governments of Piura and Arequipa and the national environment council (CONAM)
Project duration:	July 2007 to June 2008
Main components:	Generation and distribution of information on climate variability and climatic impacts Integrating climate change aspects into development and investment planning

"Wiracocha, kay hatun allpa chiripi tiayku llipiku" – this is Quechua and means "My Lord, we all live here in this cold and magnificent range". I don't know since how long we have taken our alpacas and llamas up to Tumpullo for pasture. Around the corner of my house, there are some ruins from Incan times. We are 4000 metres high and the cold winds come from the glaciers of the old Coropuna volcano.



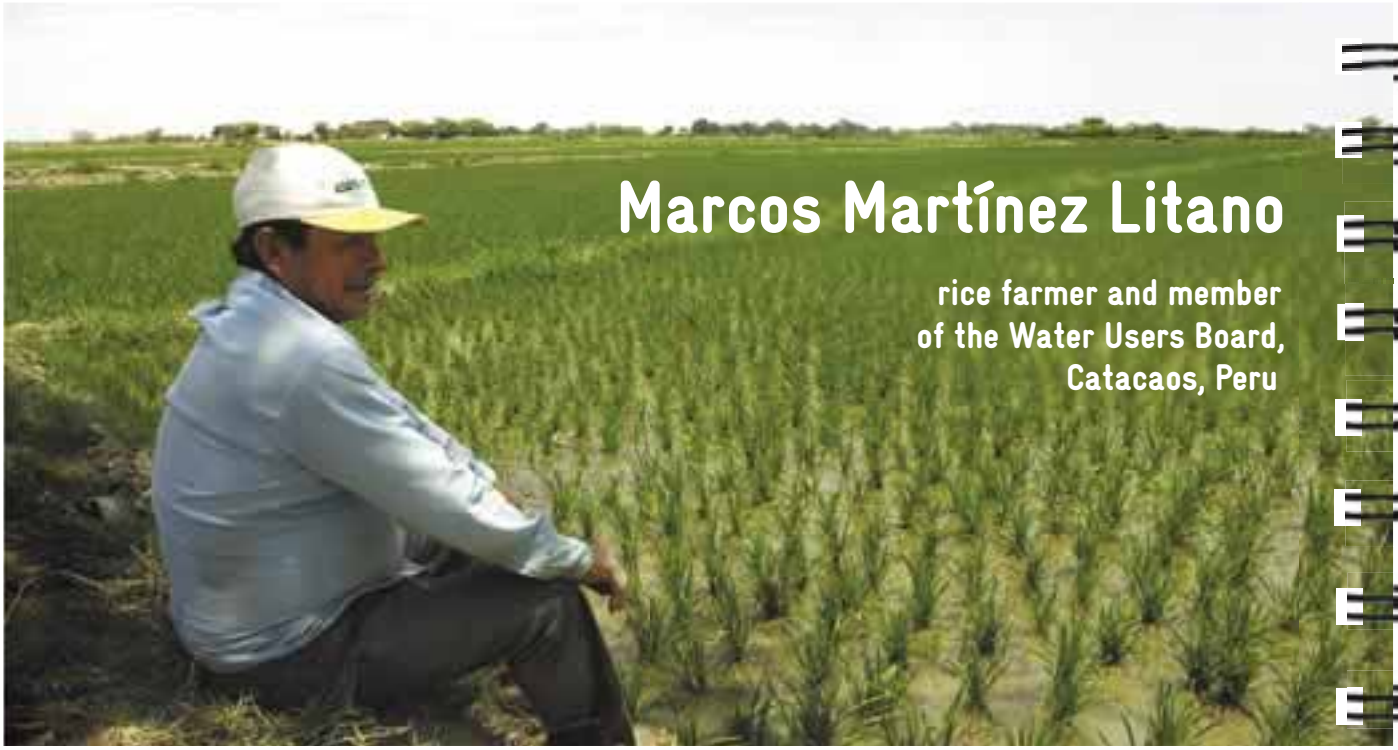
Baltasara Sillota Laguna

farmer and lama-shepherdess at the Tumpullo high Andean plateaus, Arequipa, Peru

This year, we had many problems. The cold has stolen the smile from our children's faces suffering from cough. Our animals have died in great numbers from black diarrhoea. The frost has ruined the irrigation channel running down the mountain and large amounts of water get lost. On top, we had very little rain all these years. What is going on there?

We could not sow our bitter potatoes this year to make chuño for food stock, like we and our ancestors have done for centuries. But we found a new way: The Mestizos, people of mixed native and foreign ancestry, who live down in the warmer valleys, say they are suffering as well. They now bring us their potatoes, which we freeze-dry in the cold nights up here to make chuño. They pay us with potatoes, so we can get our own chuño.

Here I grow my rice. I don't have enough capital, so I have to work with loans from a fertiliser and herbicide shop. The advantage of rice is that we can stock it at home and sell it little by little, when the price is better. In recent

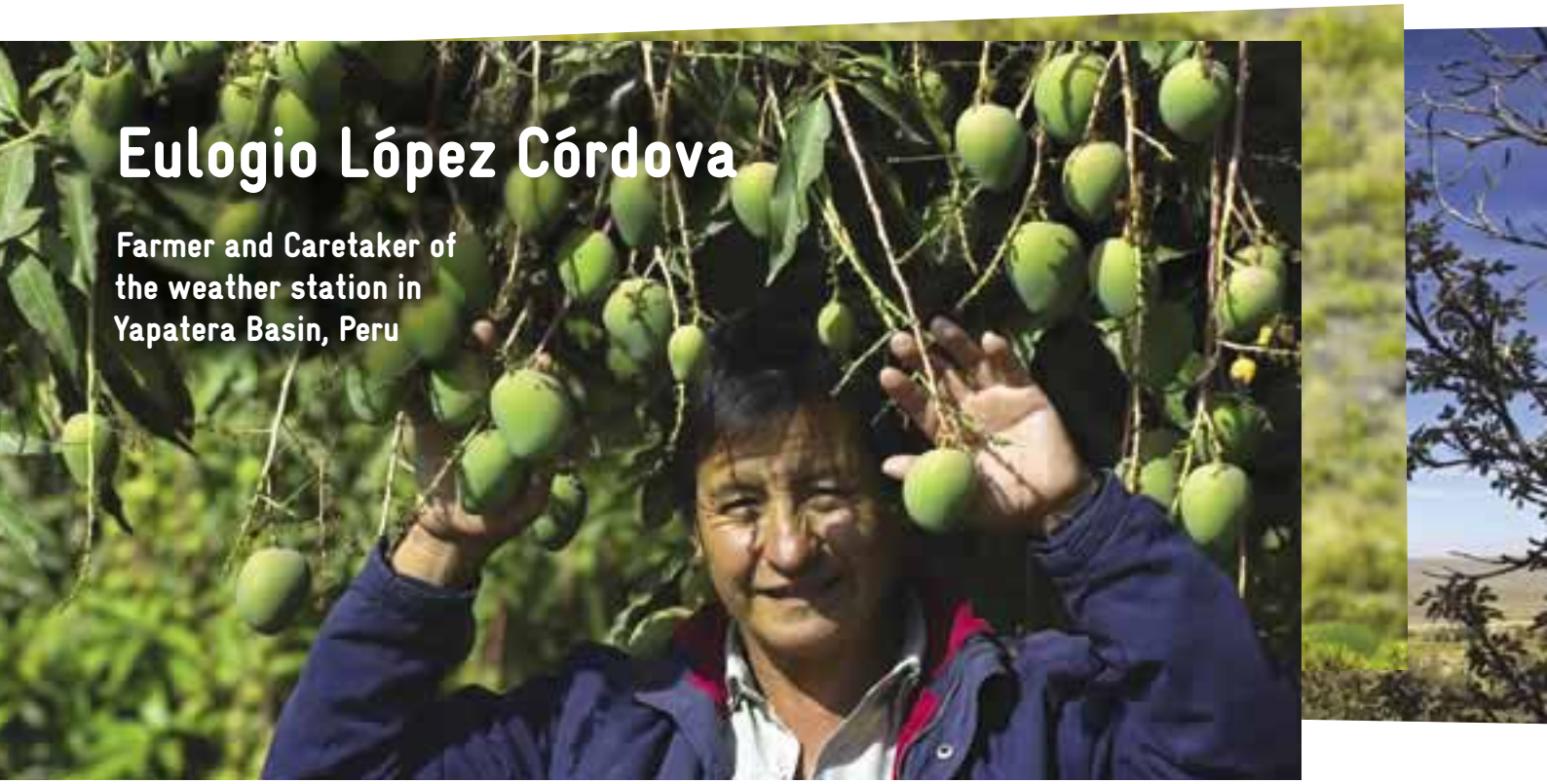


Marcos Martínez Litano

rice farmer and member of the Water Users Board, Catacaos, Peru

years, however, I haven't been too lucky. There is not enough water and rice is very sensitive when I extend the irrigation intervals. We had to grow beans for some time because with the cold weather rice takes too much time in the nursery. Sowing is delayed, flowering is delayed and with the fog – unknown to us before – the grain does not develop. I believe we have to do something and we are discussing it in the Water Users Board.

This climate change is worrying me a lot. In older times, we had the knowledge that our parents learned from their parents. The state of the Jordan River, some plants and the August winds indicated to us the coming of rains and whether these will be strong or not. Also the



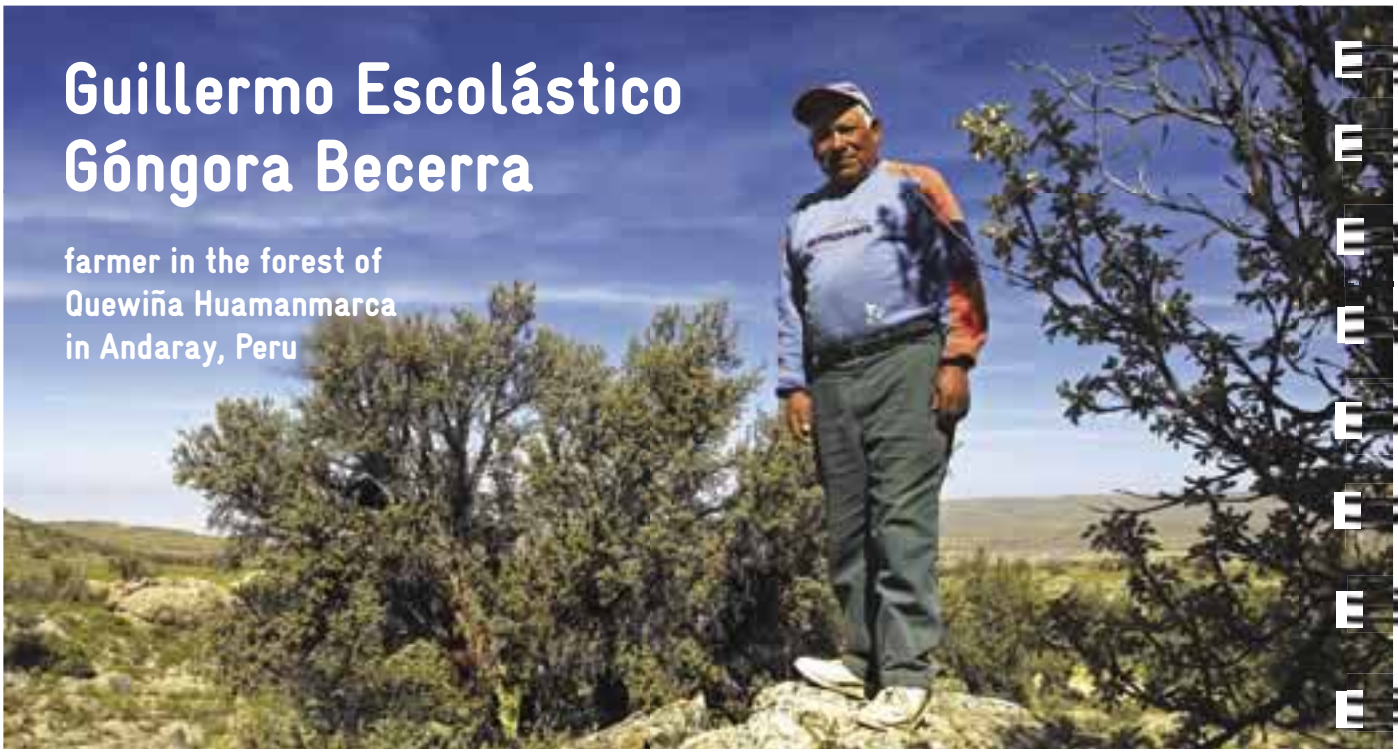
Eulogio López Córdova

Farmer and Caretaker of the weather station in Yapatera Basin, Peru

Bristol moon almanac has helped us to determine the date and the amount of sowing. Only that has been of help and it has helped us well.

But today all that is not working anymore. The Jordan River can be wrong and the Bristol confuses us. Perhaps we sow too much and lose seeds, as in 1997. Almost the entire basin lost its crops. Today, I am learning to see the satellite images and understand La Niña, because the cold comes from Chile, from the sea. If we learn to handle it, it will not be that bad because we have fewer pests and with Biol (an organic phyto-stimulant) our plots are clean all year round. The cold weather can also be good; we need to learn to love it.

It is worth recalling that the Incas enforced sustainable handling of the forest and applied severe penalties to those that destroyed it. My father told us that he recalls having seen the foothills of the Coropuna snow peak full of woods. Between the trees, water would spring and pasture was always green. Nowadays we see a few woods only, and some of them are very thin.



Guillermo Escolástico Góngora Becerra

farmer in the forest of
Quewiña Huamanmarca
in Andaray, Peru

Some time ago, a group of scientists from the Quewiña Institute of Bolivia visited us and calculated that a tree we had here was about 500 years old. Unfortunately, last week it was cut down. The problem is that there is no water and the people need money. Each wood load can be sold for ten Soles, and from a tree one can easily obtain 100 or 150 Soles. It is something. I try to talk to the people and beg them not to cut trees anymore because there is no more green pasture and there are no more springs. The little we have is sacred. The deer and the puma and now the Coropuna snow peak, all those marvels, are leaving us.

National strategies for adaptation to climate change

Many countries in the developing and developed world have begun to introduce national strategies for adaptation to climate change.

Adaptation is a vast task, requiring the coordinated efforts of different actors within and also beyond the state. It depends upon the cooperation between different line ministries, the ministry of the environment, ministries of finance and planning, as well as specialised agencies like geological and meteorological services and institutions for disaster prevention. Broad stakeholder involvement is key to success.

A National Strategy can help to

- Provide a framework for coordinating adaptation activities
- Create a vision for mid- to long-term perspectives for adaptation
- Enable informed decision-making based on information about vulnerabilities, impacts and adaptation options
- Raise awareness in all sectors affected
- Mobilise support in the country as well as from the international community
- Prepare the ground for appropriate institutional structures for adaptation

National adaptation strategies start with sharing and distributing information about vulnerabilities and impacts of climate change. They contain a characterisation of inter- and intrasectoral adaptation options. Intersectoral needs include research, early warning and monitoring systems and institutional capacity building. Intrasectoral or regional strategies may be developed in a parallel bottom-up process involving all relevant sectors. Participation at the local level is key to implementing adaptation. Finally, the formation of priorities and action plans is the basis for implementing the strategies. By establishing effective monitoring and evaluation mechanisms and putting the strategies into concrete action, they will become “living documents”.

Indonesia

Project Profile: Indonesia

Project name:	Preparation of a National Strategy for Adaptation to Climate Change
Partners:	Indonesian Ministry of the Environment (KLH)
Project duration:	In preparation
Main components:	Strengthening integration and coordination of the process for the formulation of the strategy Policy advice for adaptation options

Currently one of the major challenges in Indonesia, which will most likely be exacerbated by climate change, is unevenly distributed rainfall over time and space. The islands of Java, Madura, Bali, West Nusa Tenggara and East Nusa Tenggara all suffer from a water deficit during the dry season. These islands host about 65 percent of Indonesia's population, 60 percent of its irrigated agricultural areas as well as about 70 percent of its industry. During the rainy season, many of Indonesia's rivers swell with large discharges causing floods, while the upper watersheds of many major rivers suffer from land degradation. Many people still inhabit flood and landslide prone areas.

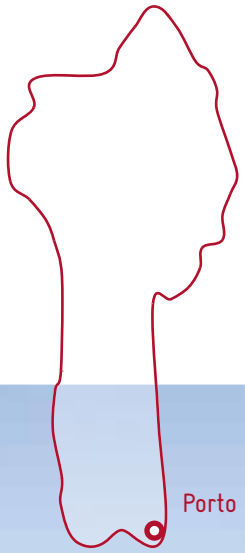
Dr. Sutardi

Ministry of Public Works and Executive Secretary of Indonesia Water Partnership

It is clear that action needs to be taken to aid people whose existence is threatened by natural disasters in these areas. With this in mind, a climate adaptation strategy, coordinated by the Ministry of Environment and supported by GTZ and involving several of Indonesia's ministries and agencies, has been initiated. This programme aims to share and distribute the available information about vulnerabilities, impacts and adaptation schemes. It should provide a framework to improve the institutional capacity of the different agencies and ministries to coordinate their efforts. It will hopefully help us in the formation of a joint vision on adaptation options and in the development of mid and long term perspectives, especially with regards to the allocation of scarce funds.

My personal experience is that most people have not yet integrated the issue of climate change into their everyday life. They still feel there was just a bit "too much rain" during the rainy season or "too little" in the dry months. It is not easy to realise that these are the first signs of a permanent change. However, as Indonesia is the host of the 13th Conference of the Parties to the United Nations Framework Convention on Climate Change, top policy makers, members of the cabinet and of Parliament have become aware of climate change issues. This actually offers a chance to built commitment for our national mitigation and adaptation plan.

Benin



Project Profile: Benin

Project name:	Adaptation to climate change through integrated watershed management in the northwest of Benin
Partners:	Ministry for the Environment and Conservation; Committee for the National Action Plan on Adaptation (NAPA); Local institutions; National Institute for Agricultural Research Benin (INRAB)
Project duration:	January 2006 to June 2007
Main components:	Enhancement of water availability Awareness raising

Continuity is a major challenge for agricultural and forestry measures such as those in our pilot project on adaptation to climate change through

Werner Dickoré

DED Coordinator in Natitingou, Benin

sustainable cultivation in the north-western watersheds of Benin. We are just at the beginning. And getting our feet on the ground will not be a matter of one or two years. Just as the climate effects show their impact over decades, it takes much longer to achieve viable results. Thus adaptation efforts must continue over a substantial period.

The main problem in our lowlands is the water balance. Together, we have developed a plan. Small protective barrages around the fields and a stonewall planted with deep rooting vetiver grass reduce erosion and retain the water where it is needed. Leguminous plants are planted on the fields to rejuvenate the leached soils and prevent them from drying out.

Inoussa Ayin

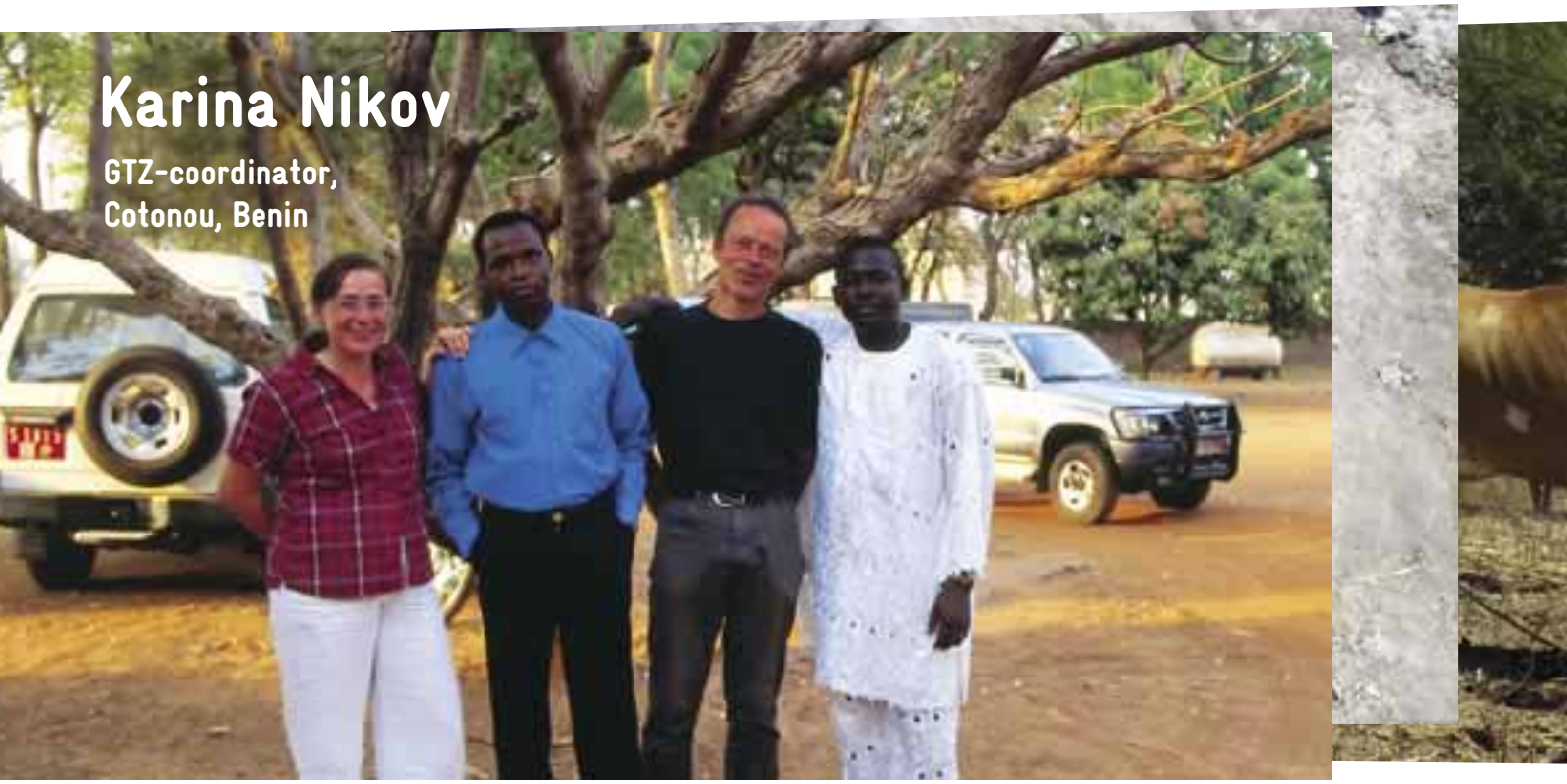
Farmer in Kadolassi, Benin

Jonas Hinvi

National Institute of Agricultural Research (INRAB), Benin

I see three major achievements of the adaptation and sustainable cultivation project. First, people have understood what major challenges they have to face and why action is needed now. Second farmers became more flexible in the variety of crops they can plant by pre-planting rice seedlings, which allows them to work on cotton, our major cash-crop, when needed. We are testing the yield of drought resistant varieties with a shorter vegetation cycle here as well as the traditional varieties for direct seeding.
Finally, the regular excavation of wells also allows for vegetable cultivation during the dry season, offering additional income, especially for the women.
So we are on the road to addressing climatic change on a local basis, though nobody at this time has one answer on how best to handle this problem.

The strength of our pilot project rests in its synergies. The water programme and the resource management programme have been involved, as have the national environment ministry and the agricultural research institute. When we started, farmers did not know about climate change at all and the bureaucrats had just started to talk about it. Our initial awareness programme in only two

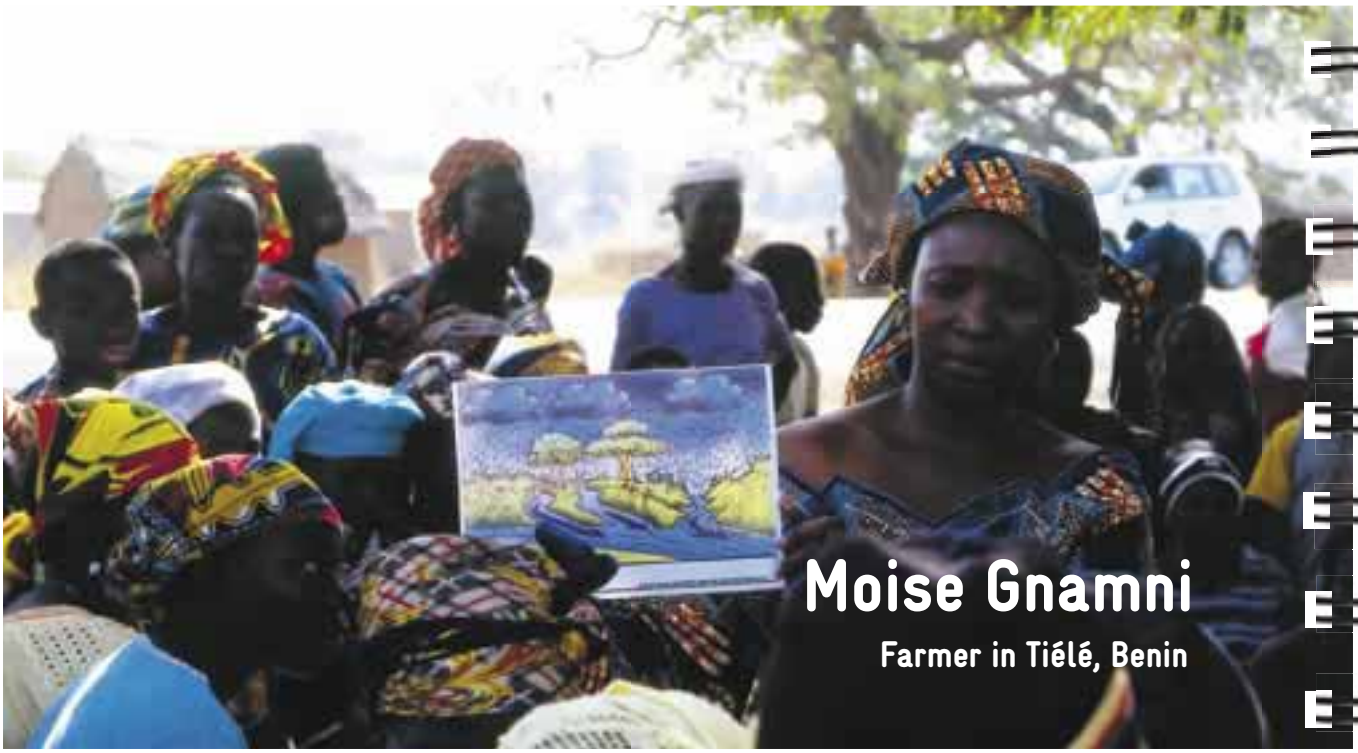


Karina Nikov

GTZ-coordinator, Cotonou, Benin

villages has now spread all across the country. In addition to involving all national actors at an early stage we found that our monitoring regime, in which 20 people meet every three months to discuss adaptation issues, is important in adjusting to challenges and in keeping up all the participants' motivation. Especially with respect to politics, this has proved to be very helpful. We brought civil servants from the capital out onto the fields to show them what was going on there and this has had substantial positive impacts on the overall political strategy of the project. What is needed, however, is long-term continuity to allow for real change and adaptation to climate change in the agricultural sector.

We have learned through the awareness campaign about the earth's water cycle and the impacts of climate change. I have participated in an exchange visit to farmers, who directly put leguminous plants into the



Moise Gnamni

Farmer in Tiélé, Benin

soil. So I am now trying this out myself to see if it works in Tiélé. I have planted one field of yam with and another one without muncuna and one with muncuna only. The cover crops will prevent erosion and keep water in the soil. In the next rainy season the crops will sprout again and the soil will be loose, so that I can plant the maize directly between the muncuna. That will save time as well. 37 women and 3 men have also started vegetable fields now and sold their first leafy vegetables this year.

What do we know?

The 2007 report of the Intergovernmental Panel on Climate Change (IPCC) leaves no doubt: Climate change will hit developing countries most severely. The fourth assessment report of the IPCC, especially the contribution of its working group on impact, adaptation and vulnerability[1], paints a grim picture:

In Africa, between 75 and 250 million people will face additional water stress within the coming decade. In regions that depend on glacial water, as in the Andes and the Himalayas, water supplies will drastically decrease in the long run. In the short run, increased discharge from these glaciers threatens large river basins with flash floods.

Over the past century, the global sea level rose 3 cm per decade on average. The rapid melting of the Greenland and West Antarctic ice sheets could result in sea level rise of 4 to 6 metres, threatening hundreds of millions of people and the infrastructure of coastal megacities all over the world. Rising sea levels would also destabilise coastlines due to increased coastal erosion, inundation and ecosystem losses, and lead to the salinisation of groundwater in key fertile areas. Extreme weather events such as storms, floods and droughts are likely to increase in frequency and strength.

According to the IPCC's report, Central and South Asia could lose as much as 30 percent of their agricultural yield by 2050. The world's largest rainforest in eastern Amazonia might be transformed in to savannah within the same time period.

An escalation in the number and magnitude of heat waves will increase health risks in many North American, Mediterranean and Australian regions and lead to decreased agricultural yields and more frequent wild fires. Biodiversity is expected to undergo the most dramatic depletion since the extinction of the dinosaurs about 65 million years ago. 43 percent of tree species in Amazonia may disappear and some regions of Australia, notoriously rich in terms of biodiversity, may lose an even higher percentage of species in general. Such sudden changes in the biotic composition of ecosystems will exacerbate the already alarming situation.

"In all regions, there are certain areas, sectors and communities which are particularly vulnerable, for example the poor, young children and the elderly," note the 450 scientists of the working group on impacts, adaptation and vulnerability. Their prediction of a 1 to 5 percent global mean loss of GDP for a global temperature rise of 4 degree Celsius disguises the disproportional catastrophic social and economic impact of climate change on particular regions and especially on impoverished people in Africa, Asia and Latin America.

"There is still time to avoid the worst impacts of climate change, if we take strong action now" is the message of former World Bank chief economist, Sir Nicholas Stern. In a widely publicised report to the UK government, Stern estimates that investing 1 percent of global GDP to mitigate and facilitate adaptation to climate change could prevent long-term losses of between 5 and 20 percent of global GDP.

The Stern-report concludes: *"Adaptation to climate change – that is, taking steps to build resilience and minimise costs – is essential. It is no longer possible to prevent the climate change that will take place over the next two to three decades, but it is still possible to protect our societies and economies from its impacts to some extent – for example, by providing better information, improved planning and more climate-resil-ient crops and infrastructure. Adaptation will cost tens of billions of dollars a year in developing countries alone, and will put still further pressure on already scarce resources. Adaptation efforts, particularly in developing countries, should be accelerated."*[2]

[1] *IPCC (2007): „Summary for Policymakers". In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contributing of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.*

[2] *Stern, N. (2006): The Stern Review: The Economics of Climate Change*

Examples of potential key vulnerabilities of regional systems

Source:
IPCC (2007): Climate Change 2007: Impacts, Adaptation and Vulnerability, Chapter 19. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, http://www.gtp89.dial.pipex.com/19.pdf

Symbols used by the authors:

red = high confidence,
orange = medium confidence,
blue = low confidence

Africa

Asia

Latin America

Polar regions

Small islands

Indigenous,
poor or isolated communities

Drying in Mediterranean, Western North America, Southern Africa, Southern Australia, and Northeastern Brazil

Inter-tropical mountain glaciers and impacts on high-mountain communities

Relationship between temperature and risk

Temperature change by 2100: up to 2°C (relative to 1990–2000)	Temperature change by 2100: 2°C to 5°C (relative to 1990–2000)
• Tens of millions of people at risk of increased water stress • Increased spread of malaria	• Hundreds of millions of additional people at risk of increased water stress • Increased risk of malaria in highlands • Reductions in crop yields in many countries • Harm to many ecosystems
• About 1 billion people would face risks from reduced agricultural production potential, reduced water supplies or increases in extreme events	
• Tens of millions of people at risk of water shortages • Many endemic species at risk from land-use and climate change	• More than a hundred million people at risk of water shortages • Low-lying coastal areas, many of which are heavily populated, at risk from sea-level rise and more intense coastal storms • Widespread loss of biodiversity, particularly in the Amazon
• Climate change is already having substantial impacts on societal and ecological systems	• Continued warming likely to lead to further loss of ice cover and permafrost • Arctic ecosystems further threatened although net ecosystem productivity estimated to increase • While some economic opportunities will open up (e.g., shipping), traditional ways of life will be disrupted
• Many islands already experiencing some negative effects	• Increasing coastal inundation and damage to infrastructure due to sea-level rise
• Some communities already affected	• Climate change and sea-level rise add to other stresses • Communities in low-lying coastal and arid areas are especially threatened
• Climate models generally project decreased precipitation in these regions • Reduced runoff will exacerbate limited water supplies, decrease water quality, harm ecosystems and result in decreased crop yields	
• Inter-tropical glaciers are melting and causing flooding in some areas • Shifts in ecosystems are likely to cause water security problems due to decreased storage	• Accelerated reduction of inter-tropical mountain glaciers. Some of these systems will disappear in the next few decades

India

Project Profile: India

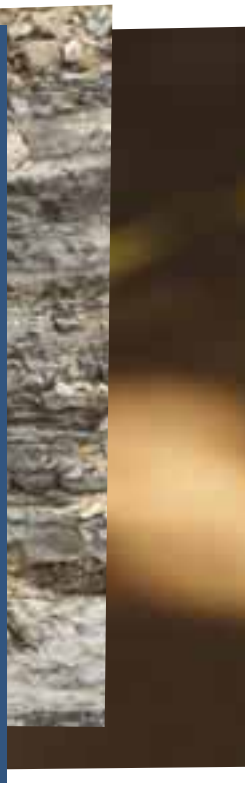
Project name:	Adaptation to climate change in rural areas
Partners:	Ministry of Environment and Forests (MoEF)
Project duration:	In preparation
Main components:	Pilot projects on "Climate Proofing" in rural development programmes Promotion of weather based index insurances

At BASIX we provide access for poor people not only to micro-credits but also to micro-insurance in 8 states and 10,000 villages of India. We do so by offering a link between insurance companies and poor households to their mutual benefit. Without our mediation service, these two groups would probably never get in business. The approach taken by BASIX is to provide a whole suite of insurance products to cover the risks related to the livelihoods of its customers. Today BASIX is in a position to provide life and health insurance for its customers and also insurance for their various livelihood activities like agriculture, livestock rearing and non-farm enterprises.

In 2003 we started to develop insurance packages for poor farmers to cope with the uncertainties of weather. Weather risks are not new and have always been of major concern to farmers. Poor farmers cannot afford and manage conventional crop insurance schemes and their lengthy procedures. Thus, a single crop failure can wreck their precarious livelihood. As a starter,

Penumetcha Sai Gunaranjan

Head of Insurance Business at BASIX, Hyderabad, India



our index-based weather insurance offers a simple and affordable product to 20,000 small farmers in arid and isolated rural areas at a price between 100 and 300 rupees per year, which is only about two to five times the daily minimum wage under the National Rural Employment Guarantee Scheme. If precipitation and temperature in their region deviate significantly from the long time index during the crucial time of a season, a fixed amount of money is paid out to the client if and at the time the losses occur at harvest.

Climate change aggravates the severe vulnerabilities our customers have always been exposed to. At the same time, extreme variations in weather patterns make insurance companies more reluctant to cover such risks on an index base. This makes weather insurance even more unaffordable to the poor. That is why our efforts are more necessary than ever.
While we tackle challenges to make weather insurance work, we also realise that risk management in agriculture has to reach beyond financial instruments such as insurance. We need to bring in a package of practices and services to farmers to minimise their risk from the outset, improve productivity, and enable market linkages to manage price risks. We still have a long way to go.

Nicaragua

Project Profile: Nicaragua

Project name:	Adaptation to climate change through disaster risk management in two regions
Partners:	Autonomous government of the North Atlantic Region (GRAAN) and the municipalities of Waspam, Bonanza, Rosita and Santa Teresa
Project duration:	November 2004 to November 2006
Main components:	Strengthening disaster risk management capacities and integrating these capacities in planning processes

Marical Jaen

Community-eco-tourism developer, Loma de Viento, Nicaragua

The heavy rains we now experience here in the Santa Teresa area during the rainy season can turn our lovely brooks into dangerous streams within hours. Much of the forest has been cut down over the past years and thus the downpour causes mudslides and floods. Deforestation is the biggest ecological problem here. If we can make money from tourists adoring the trees instead of cutting them, this will be progress. Two years ago, my father went to Costa Rica and then decided: "We will start an eco-farm here in Loma de Viento. Since then we have come a long way: twelve families have formed a cooperative and are now working on this project together. First, we started reforestation up on the hill to prevent more mudslides.

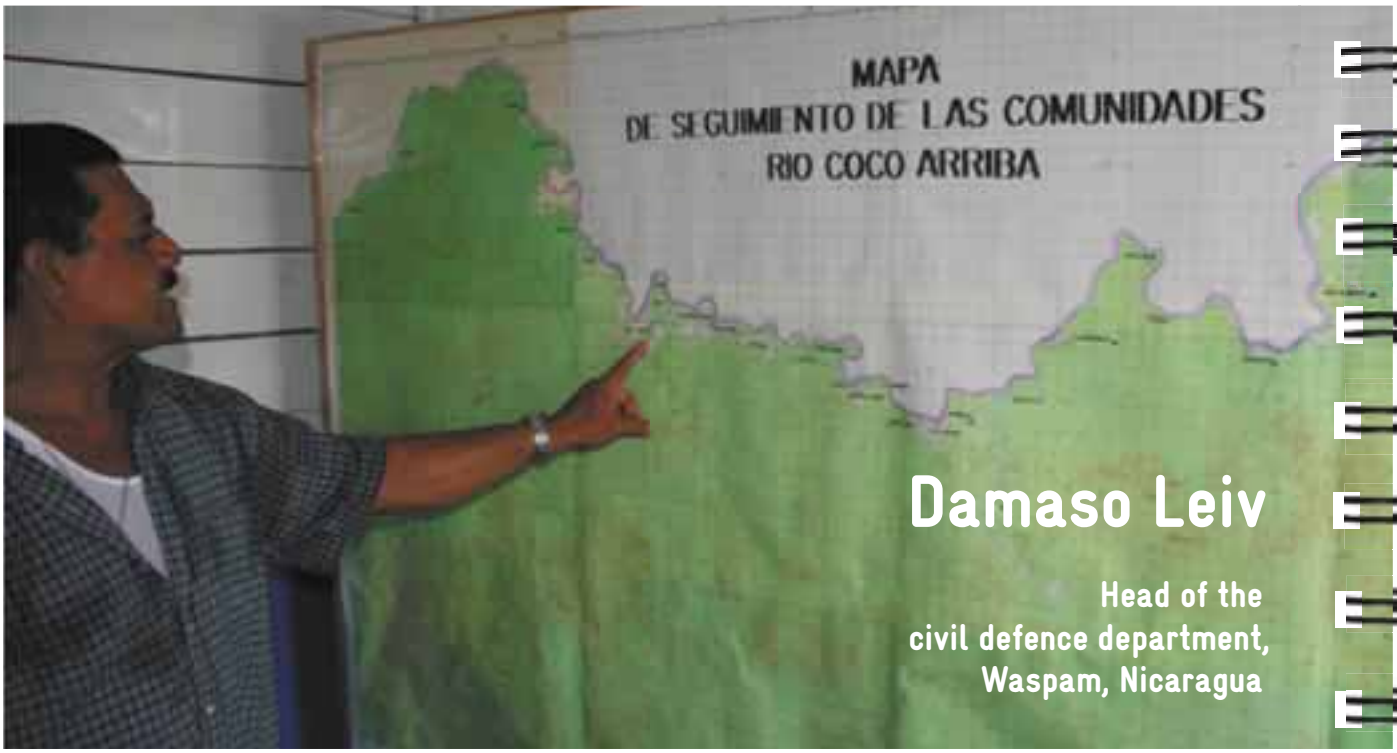
We also laid out gardens and an iguana farm, and have paved pathways through the jungle. There is much to see here. This tree[3] is older than Columbus – 600 years!

We will do it all organic: cucumbers, maize, beans, bananas, papaya, and oranges. We also have a swimming pool and a website for the tourists. The first huts for the guests have been built with running water and even air conditioning. Now we hope that the municipality keeps its promise to fix the road to our village. Without this, we will never have guests, of course. What else do you think tourists will need here? Coca-Cola? Is there also organic Coke?

[3] see picture at the top of page 26

The river is our life: it provides us with water, fish, transport and beauty. But sometimes it has brought us death as well, and not because of the crocodiles: the river has washed away whole villages.

I am in charge of the civil defence in the Waspam municipality. We collect information on rainfall, the river's water level and the weather forecast, and inform our colleagues down the river Coco. We also work with colleagues in Honduras, where the



Damaso Leiv

Head of the civil defence department, Waspam, Nicaragua

river begins. When the rain starts and the water rises, we have only two hours to warn the folks downstream. Sometimes it's a matter of half an hour. Sometimes, the rain comes fast and heavy. 70,000 people live along the 700 kilometres of the Rio Coco.

We have now established a chain of 40 radio stations that can send and receive the alarm and can constantly inform us on the daily precipitation. Yes, we are better prepared for the dangers of the river now.

But when the hurricane comes – what can we do? It comes every 10 years or so: "Fifi" in 1972, "Joan" in 1988, "Mitch" in 1998, "Beta" in 2005. We have practised and we have emergency plans now: the people gather in the churches, which are usually the sturdiest buildings, and watch the wind take their properties – but at least not their lives.

Last time the water came, it was that high [see picture]. I am glad there is a dam now and we hope it will withstand the flood next time it comes. However, money ran out and they could not finish the dam. They said: "We needed the money to protect your neighbour as well." His dam is not finished either. If the government had asked me before they started the construction, I would have told them to use the 10,000 Dollars rather for a new home further up the hill – it would have been safer for my family and cheaper for them as well.

Manuel Modena

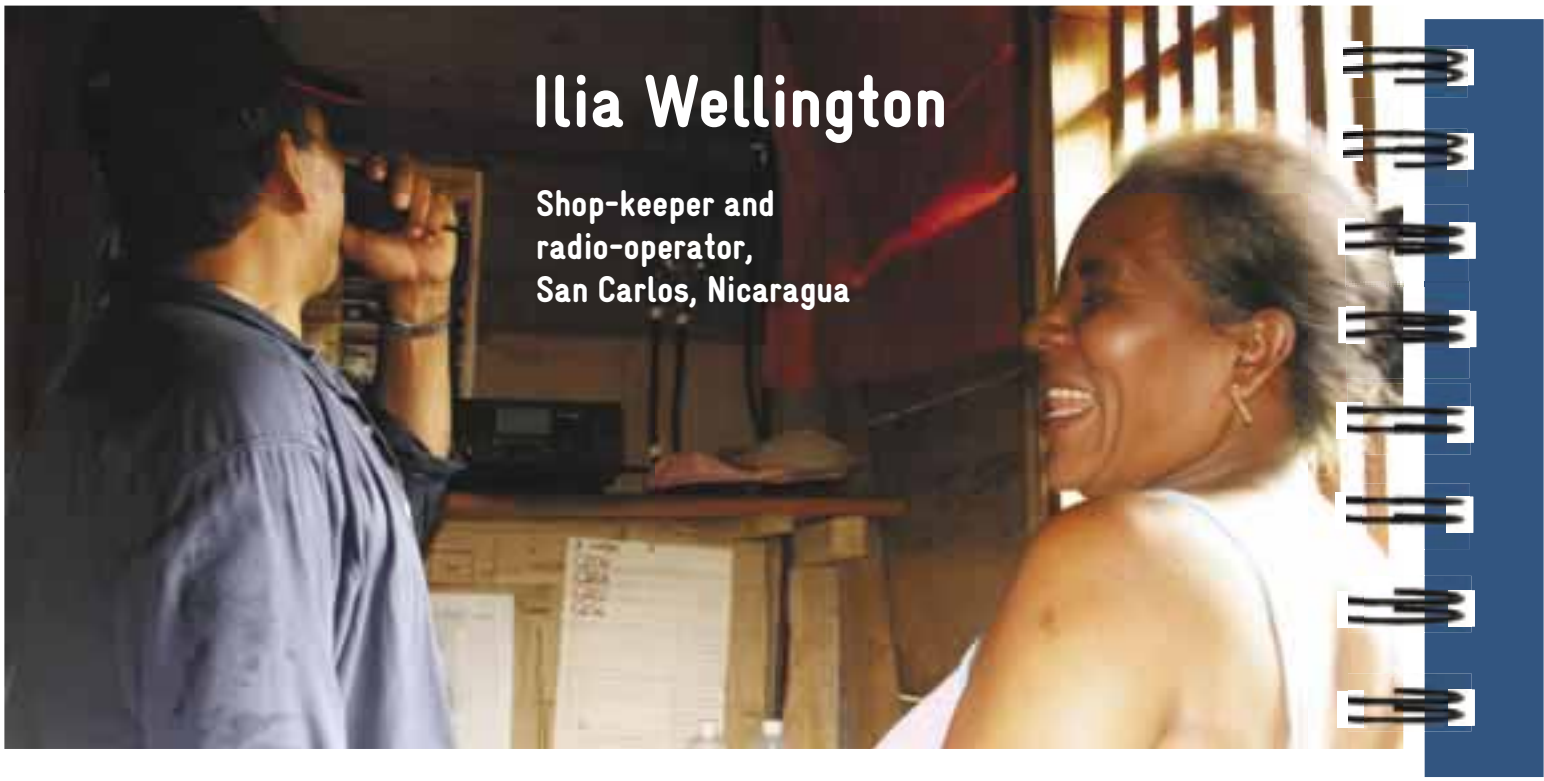
12 years, Rio Coco, Miskito Nation, Nicaragua

If the water comes I am not afraid. I can swim, my sister can swim and we have a boat. But the rice can't swim and my father's house can't swim either.

José Alberto Cruz

Farmer and construction worker, la Mohoza, Nicaragua

I am the radio-operator of San Carlos. I even have a certificate for it. We report on the water level and rainfall every day and we have a great responsibility in emergencies. But the radio serves all kind of purposes now: information on prices, family



Ilia Wellington

Shop-keeper and radio-operator, San Carlos, Nicaragua

news, appointments, health emergencies and, you know, a lot of jokes as well: its fun! People are supposed to pay for radio use now, so that we can maintain the network. They can pay in Cordobas or in rice.

I run the shop here with my husband, but don't get me wrong: we don't make any money from the radio. It's a public service and we are proud of it.

Mainstreaming adaptation

Adaptation to climate change is not a new environmental issue but an inter-sectoral challenge to public and private planning and investment. The recent IPCC report on impacts, adaptation and vulnerability identifies the sectors most affected as:

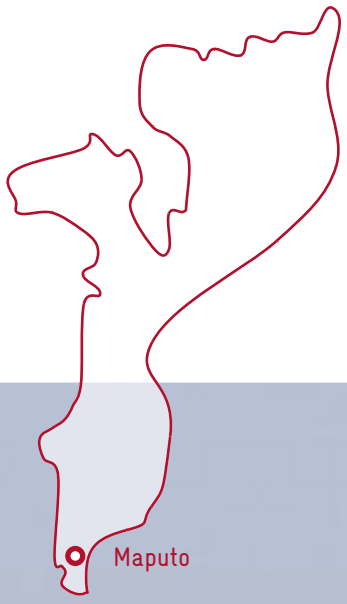
- freshwater resources and their management,
- ecosystems and their properties, goods, and services; food, fibre and forest products;
- coastal systems and low-lying areas;
- industry, settlement and society;
- human health.

In all of these areas the anticipation of and preparation for climate change in planning and investments is essential for sustainable development. A recent World Bank report on managing climate related risks estimates that a quarter of the Bank's projects are seriously jeopardised by climate change. An OECD study found that up to 65 percent of official development assistance is negatively impacted by climate change.

However, only shared visions among all stakeholders involved in development cooperation can possibly raise the status of adaptation to climate change in global decision-making from marginal consideration to a driving force of sustainable development. This requires many sectors and actors to address the most urgent threats first: all known risks, uncertainties and eventualities must play an integral role in joint efforts for economic and social improvement. Thereby, the process of mainstreaming adaptation to climate change has to be tailored to the various actors and their needs; it ranges from initial awareness raising as a first step to formal obligations for planning processes and using risk management tools in order to make development projects "climate proof."

While the donor community has declared the need to mainstream adaptation to climate change into development cooperation in several high level policy documents, experience with conceptual and methodological approaches is limited thus far. German Development Cooperation is actively developing practical mainstreaming approaches: GTZ performed a portfolio screening of its worldwide programmes in order to explore their links to climate change impacts. Pilot projects on the incorporation of climate change-related considerations into existing programmes have started in several countries. In cooperation with the Potsdam Institute for Climate Impact Research, a manual on how to manage data on climate change – which often is perceived as a bottleneck for concrete action – is being developed to facilitate programmes on adaptation and the "climate-proofing" of existing programmes. Furthermore, on behalf of the Federal Ministry for Economic Cooperation and Development GTZ is developing concepts that will formalise such "climate proofing" procedures in the institutions of German development cooperation. Finally, support for mainstreaming climate change into national decision making of developing countries is becoming the subject of German-funded bilateral programmes like the forthcoming "climate proofing" of public investment programmes for rural areas in India.

Mozambique



Project Profile: Mozambique

Project name:	Integrating adaptation to climate change within disaster risk management systems in the Búzi river catchment area and other regions of Southern Africa
Partners:	Sofala province government, the committee for the National Adaptation Programme of Action (NAPA) and the National Disaster Management Institute (INGC)
Project duration:	June 2004 – December 2006
Main components:	Participatory risk analysis and development of risk maps Establishing local disaster management committees

Due to our geographical location, Mozambique is extremely vulnerable to natural disasters. Floods, tropical cyclones, droughts, windstorms and subsequent epidemics and erosion hit hard and with increasing frequency. More than 60% of our people live below the poverty line. This severely limits their capacity to cope with such disasters.

More than 700 people died when on February 2000, the category 4 tropical cyclone "ELINE" and major floods hit Mozambique. Faced with the catastrophic consequences of floods and cyclones in the south and centre of the country, we realised that many lives could be saved with better capacity and structure for disaster management at all levels in the areas of prevention, preparation and response to such climate disasters.

Moisés Vicente Benessene

National Director of the National Institute of Meteorology, Mozambique

GTZ, the Sofala province government, the committee for the National Adaptation Programme of Action and the National Disaster Management Institute undertook a disaster risk reduction project that sought to increase the coping capacity of local communities. Among other measures such as training and the formation of emergency committees, we introduced a people-centred early warning system in the region of the Buzi river basin. This system enables swift and direct communication of weather information between the communities along the river as well as with the regional and national capitals and ensures that communities are ready to use this information.

Between December 2006 and February 2007, heavy rains across northern and Central Mozambique, together with severe rainfall in neighbouring countries, led to flooding along the Zambezi River Basin. On February 22, 2007, another category 4 tropical cyclone, "FAVIO", made landfall in Central Mozambique. "FAVIO" caused enormous damage, but this time there were no fatalities.

International politics of adaptation

For a long time, adaptation to climate change was only of marginal importance within the international climate change community. It was perceived as a distraction from tackling the root causes of climate change and mitigating global emissions. Today however, there is solid scientific evidence that global warming is already taking place and adverse impacts are perceivable. As a result, adaptation to climate change has become a key element in international climate change negotiations.

Article 4.1 of the United Nations Framework Convention on Climate Change (UNFCCC)[4] states that parties shall *"…formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to … facilitate adequate adaptation to climate change,…"* and *"…cooperate in preparing for adaptation to the impacts of climate change."* Article 4.4 states that developed countries shall *"assist the developing country parties that are particularly vulnerable to the adverse effects of climate change in meeting the costs of adaptation to those adverse effects."*

Recently, negotiations under the UNFCCC and its Kyoto Protocol are increasingly oriented towards adaptation issues. While the Convention addressed funding for adaptation as early as 1995, it was not until the adoption of the Marrakesh Accords in 2001 that adaptation became a prominent area for action. In 2004 the parties of the convention reached a milestone agreement with the Buenos Aires Programme of Work on Adaptation and Response Measures. In this agreement two complementary tracks for adaptation were set up: the development of a five-year programme of work on the scientific, technical and socio-economic aspects of vulnerability and adaptation to climate change, and the improvement of information and methodologies, implementation of concrete adaptation activities, technology transfer and capacity building. In November 2006, the12th Conference of the parties to the UNFCCC and 2nd Meeting of the Parties to the Kyoto Protocol, convening in Nairobi, made adaptation a key issue of negotiations. Governments renamed the five-year programme, calling it the *"Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change."*

In order to finance worldwide adaptation to climate change, an intricate system of international financing instruments has been agreed upon, including four global funds: the Strategic Priority on Adaptation (SPA) under the Global Environment Facility's Trust Fund, the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF) and the Adaptation Fund. While the SPA, LDCF and SCCF are operational, the institutional arrangements of the Adaptation Fund are still subject to negotiations under the Framework Convention on Climate Change. The UNFCCC Secretariat estimates that adaptation in developing countries will cost between 28 and 67 billion US$ in 2030. Given these high figures, mobilisation of adequate resources is a controversial issue. An operational concept of what adaptation constitutes – which would be the foundation for what "adequate" could possibly mean – still remains to be developed.

[4] *http://unfccc.int/resource/docs/convkp/conveng.pdf*

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Editor
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Technische Zusammenarbeit (GTZ) GmbH

Climate Protection Programme
in Developing Countries
Postfach 5180
65760 Eschborn / Germany
T +49 61 96 79 – 1329
F +49 61 96 79 – 801329
I http://www.gtz.de/climate

Responsible
Dr. Lorenz Petersen

Authors
Benedikt Haerlin
Britta Heine, GTZ

Design
Additiv. Visuelle Kommunikation
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Photos
GTZ (p. 13, 23, 31)
Thomas J. Mueller, SPDA/DED (cover, p. 6-10)
Mirka Bodenbender (p.12)
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Deutsche Gesellschaft für
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- German Technical Cooperation -

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn/Germany
T +49 61 96 79-0
F +49 61 96 79-11 15
E info@gtz.de
I www.gtz.de