

# Adaptation to climate change



COOPERATION WITH DEVELOPING COUNTRIES – CLIMATE AND DEVELOPMENT



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# FOREWORD

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*Climate protection and adaptation to climate change also help to improve the lives of children in developing countries.*

Man-made climate change has far-reaching economic and social effects, and its impact is already being felt all around the world. In fact the global average temperature has risen by 0.7 °C during the 20th century. The consequence of this is rising sea levels, melting glaciers and increasing extreme weather events with frequently catastrophic effects for man and the environment. One of the contributing factors to this is the rapid increase in greenhouse gas emissions.

For a long time, the only response of politicians was to focus solely on climate protection, particularly by promoting renewable energy sources and energy efficiency. Bringing up the issue of adaptation to climate change was initially seen as a form of capitulation, as this addressed the consequences of climate change rather than its causes.

However, this view has now changed. It remains essential to mitigate climate change

with a strict reduction of greenhouse gas emissions. At the same time it has now also become clear that adaptation measures need to be developed and implemented at the same time.

The consequences of climate change affect the world's poorest people the most – although these people have contributed the least to climate change. Many livelihoods in developing countries depend on agriculture, and yields can collapse or be destroyed altogether; access to already scarce water supplies is often made much more difficult; houses, built on hillsides around large cities, are the first to be buried under landslides.

Whereas climate protection demands a concerted global effort, adapting to climate change is usually tackled at the local level. The key is to strengthen both public infrastructures and the resilience of private groups and individuals.

Along with local communities, non-governmental organisations and district governments, representatives of the population groups most at risk are involved in identifying priority adaptation measures.

Here, the concrete measures and technologies used are usually not new. However, in conjunction with climate change they are used differently, intensified and embedded in an adaptation strategy.

What contribution can KfW Entwicklungsbank make here? It will increasingly take advantage of its comprehensive expertise in financing of development measures: experience in the financing of public infrastructures and in the management of natural resources, as well as an understanding of partner structures. In addition, KfW Entwicklungsbank also pays particular attention to ensuring that the instruments used to assess climate risks – as well as to select appropriate measures and check their effectiveness – are reliable and efficient in terms of their methodology. In certain areas it is also able to assist the transfer of technology important for climate monitoring, such as measuring systems for determining groundwater levels. In 2010, KfW Entwicklungsbank sponsored adaptation measures totalling EUR 150 million. The bilateral financing of adaptation measures on behalf of the German Government is supplemented by further initiatives at European and international level.

Additional costs are associated with the activities required to adapt to climate change – in particular with regard to infrastructure

measures such as improvements to coastal protection, flood protection measures or water storage systems for dealing with periods of drought.

At the same time, the developing countries see themselves as the victims of a process to which they have contributed barely or not at all. As a result, they feel the industrial nations have a duty to act. After all, the greenhouse gas emissions which are responsible for climate change were mostly produced in the industrial nations. At the same time, it is also in the interest of the industrial countries to help developing countries and emerging economies adapt to climate change, as the effects of climate change will intensify already existing conflicts over resources, particularly around water and land issues. These effects trigger migration and amplify undesirable fluctuations in the market prices of foodstuffs and raw materials.

In long years of international cooperation, KfW Bankengruppe has gained the trust of its partners – innovative financing for adaptation to climate change builds on this foundation. As the financing of climate change adaptation measures and the financing of development measures are closely interlinked, it is essential to give preferential treatment to tried and tested structures and instruments to ensure the ability to act quickly and effectively.

In this brochure, we aim to inform about the challenges of climate change and our approaches to solutions.



*Dr Norbert Kloppenburg*

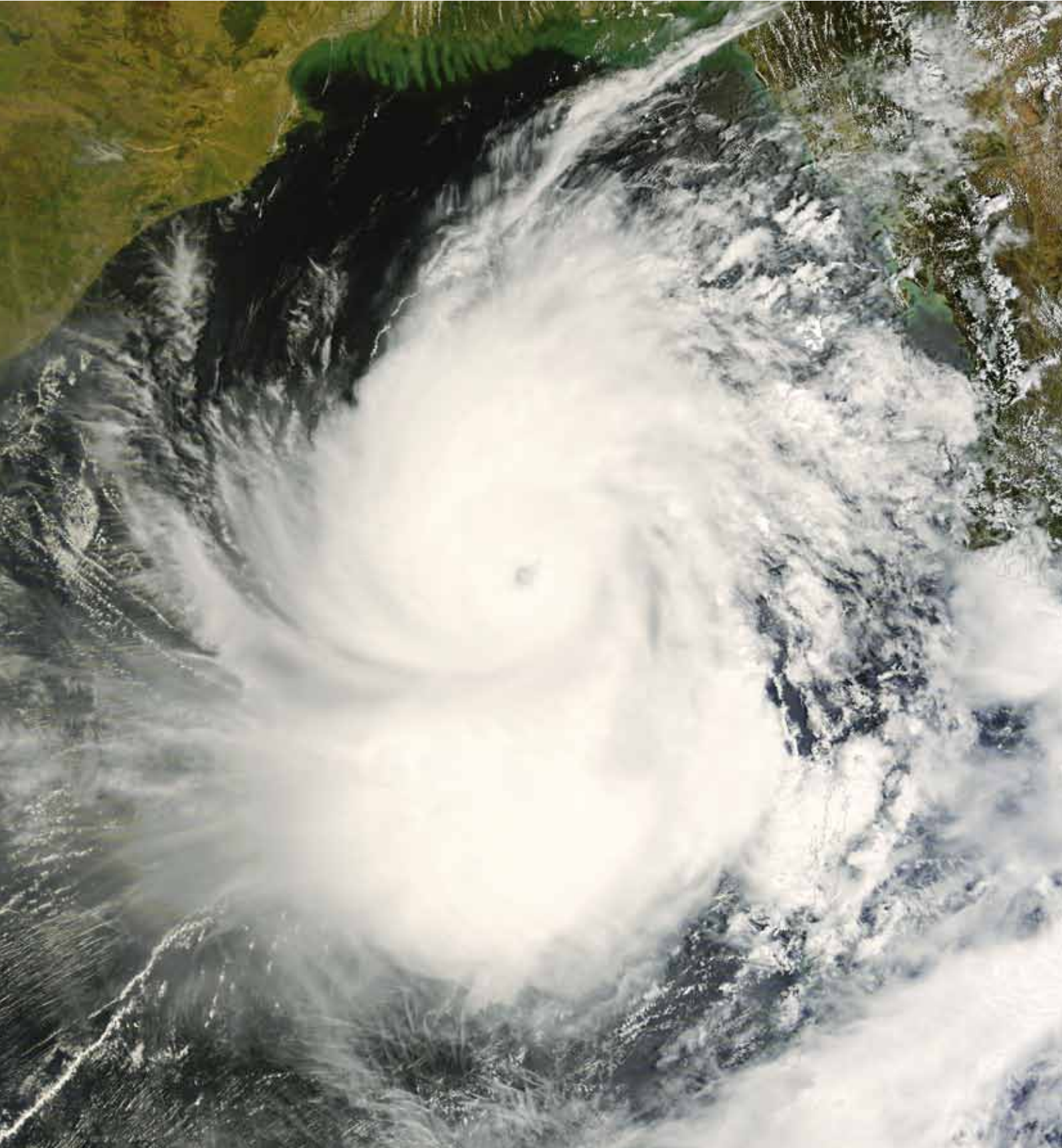


Dr Norbert Kloppenburg  
(Member of the Executive Board of KfW Bankengruppe)

# CLIMATE CHANGE IS A RISK TO DEVELOPMENT

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DEVELOPMENT REQUIRES ADAPTATION



Climate change is not a potential scenario of the future – it is already here, and its consequences are already harming people and ecosystems in many parts of the world. Developing countries and emerging economies are particularly affected. The reasons for this include their geographic location, the reduced ability of poorer countries to adapt to changing requirements, and their often strong economic dependency on particularly climate-sensitive sectors such as agriculture.

Climate change is already costing billions every year. Some economies could lose up to a fifth of their gross domestic product (GDP) as a result of climate damage. However, between 40 and 70% of this damage can be averted by timely adaptation measures.

### **Rising sea levels mean a greater risk of flooding**

During the 20th century, sea levels rose by an average of 2 mm per year – with the rise even increasing to 3 mm per year for the period from 1993 to 2003. While this may not seem like much, the consequences are severe for people who live in low-lying coastal regions or on land which is below sea level. This is the case for small island states in the Pacific and in the Caribbean, but also for countries in large river deltas like the Mekong, Ganges or Nile. In these regions, ever higher flood waves are already eroding the coast lines, resulting in the destruction of infrastructure and valuable arable land.

It is feared that a number of island states in the Pacific will largely be swallowed up by the sea by the end of the century, and as a result they already now need to start looking for new land for their population. In large river deltas which are home to millions of often extremely poor people, rising sea levels lead to the intrusion of saltwater into groundwater supplies in areas near the coast. As a result these supplies become largely unusable, both as drinking water and for irrigation in agriculture. In addition, the saltwater also damages valuable farmland.

### **Increasing occurrences of extreme weather events and higher risk of natural disasters**

The effects of climate change are clearly manifested by extreme weather events like flooding and tropical cyclones, whose strength is set to increase further still in many regions. This endangers human

lives, infrastructures and ecosystems, thereby destroying the source of many people's livelihoods.

Increasing ocean temperatures are exceeding the threshold of 27 °C earlier and earlier in the year. This threshold is considered by experts to play a critical role in the formation of tropical cyclones and now also extends to regions which rarely experienced such storms in the past. The consequences can be dramatic and devastating, as witnessed when Cyclone Nargis struck in Burma (Myanmar) in 2008, claiming more than 80,000 lives, or the flooding in Pakistan in the summer of 2010 which affected more than 15 million people.

Scientists also believe that heat waves and heavy rain events will occur more frequently. Heat waves can cause significant health hazards particularly in large cities. In addition, tropical diseases like malaria will spread to more and more regions as a result of rising temperatures.

More frequent heavy rain events will aggravate the problem of soil erosion in many parts of the world. This in turn leads to increased and more severe river flooding and represents a major challenge for flood protection, urban drainage, the effectiveness of sewage treatment plants and the protection of settlements against landslides and mudslides.

### A gradual threat

Storms and floods are spectacular consequences of climate change which are immediately apparent. However, it is the more gradual changes of temperature and precipitation patterns which will probably be more significant in the long run. In many regions, the quantity of rainfall is already scarcely enough for the supply of drinking water as well as for agriculture or forestry, or for use in the production of energy and in the manufacturing industry.

In many cases it can be expected that due to climate change this situation will worsen. In the regions around the Mediterranean, Southern Africa, north-eastern parts of Brazil and Central America, experts anticipate water availability to decline in some cases by over 20% by the end of the century. As a consequence, drinking water will become scarce, long-term efforts to combat desertification

will be endangered, and ecosystems will be permanently damaged or even destroyed.

Scientists fear that the decline in water availability in some rainforest regions, which are of significant importance for global biodiversity, will result in a shift in the variety of species and cause important species to become extinct.

Another gradual but very real consequence is the melting of glaciers, particular in the Himalayas and in the Andes. During the dry season, most of the water in the rivers comes from glacial melts. For millions of people, this meltwater forms the basis for drinking water supplies and agricultural irrigation. However, as the melting glaciers initially deliver particularly large amounts of water, this problem is often not taken seriously – but some glaciers could already disappear within the space of a few decades, with a devastating impact on drinking water supplies, agriculture and hydroelectric power generation.

### Some can also benefit from climate change

Climate change does not necessarily just have negative impacts but rather can also offer opportunities. For example, climate experts forecast a rise in precipitation levels in some regions previously characterised by water shortages. Increased water availability suggests significantly improved production conditions for agriculture in e.g. Eastern Africa and parts of South and Southeast Asia. Temperature rises can also be beneficial for the cultivating conditions in cold mountain regions, where the growing season will be longer and new types of agricultural use will become feasible. In these regions the opportunities arising from climate change must be exploited for long-term development.

*Increasing desertification is another consequence of climate change.*







*Climate change causes more frequent flooding.*

### **A major barrier to development**

For most developing countries and emerging economies, climate change is more likely to have negative impacts. In future, efforts to reduce poverty and improve living conditions will have to be implemented under more hostile climate conditions. This will affect a wide range of different areas of life, including water supply, agriculture with its importance for food security, urban development and healthcare. Depending on the geographic location, as time progresses the factor "climate" will become ever more important for development planning in developing countries and emerging economies.

It is an advantage that many measures, particularly those designed to promote economic and social development, also strengthen the capability of the affected countries to deal better with the consequences of climate change. These include for example investments in education systems or a capable financial sector, which can e.g. also offer new products like weather insurance policies as one way to deal with climate risks (see page 22).

# SUPPORTING ADAPTATION, OFFERING

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CLOSE COOPERATION IS REQUIRED BETWEEN



# INNOVATIVE SOLUTIONS

## INDUSTRIAL NATIONS AND DEVELOPING NATIONS

**The accords of the Copenhagen Climate Conference and the Cancún Climate Conference contained a strongly worded demand for increased cooperation between industrialised countries and developing countries for adaptation to climate change. In this regard, the industrial nations should make appropriate and predictable financing, technology and training available. Which particular areas are most important in terms of adaptation depends on environmental, economic and social factors in the partner countries. Adaptation is a long-term process, requiring a coordinated approach which comprises participation at the local level.**

As a general rule, when taking decisions about adaptation measures, care must always be taken to ensure investments are embedded in development planning, the local population is involved in the process and a long-term commitment is guaranteed. As a result, the basic challenges are barely any different to those which form part of the experiences gained in the field of development financing.

### **The interaction between development and climate adaptation**

There are also numerous other overlaps and interactions between development and adaptation to climate change: Development facilitates adaptation, while adaptation also promotes development. Progress made in terms of development enables the diversification of economic activities, thereby preventing one-sided dependency on highly climate-sensitive sectors like agriculture. Successful climate adaptation protects public infrastructures and safeguards the income of farmers and fishermen. At the same time however, adaptation also presents a new challenge – climate change has inherent risks, increases investment costs and places tougher demands on infrastructure operators, which in turn creates a demand for new instruments.

### **The cost of adapting to climate change**

During the 2009 International Conference of the Parties in Copenhagen (COP 15), the industrial nations announced the commitment of up to USD 30 billion in new and additional funds during the period from 2010 to 2012 for reducing emissions and adapting to climate change in developing countries (“fast start financing”). Annual funds totalling USD 100 billion for climate protection and climate adaptation were announced for 2020. This total corresponds to more than 80% of the funds which are currently spent worldwide on development cooperation.

The exact amount of money required to successfully assist the developing nations in their efforts to adapt to climate change will depend greatly on the extent of the temperature increase. The latest estimates of

USD 75 to 100 billion are only rough numbers. However, one thing is clear: without adequate financing for adaptation measures there will not be a new UN climate accord.

This fact was repeatedly emphasised by the “Group of 77”, a loose coalition of states that speaks on behalf of the developing nations in the climate negotiations. It is also clear that the overall level of investment required will be significant.

Within the framework of the resulting climate financing architecture, the bilateral Financial Cooperation (FC) will contribute its longstanding experience in the interaction between multilateral and bilateral climate financing through KfW. The quality of the adaptation measures (in terms of innovation and effectiveness) will play a major role.

### **Doing nothing costs more**

As there are still many gaps in the climate data for poorer regions in particular, decisions will need to be taken under some degree of uncertainty – as is the case for all long-term investments. This makes it so much more important that thorough risk analyses are performed, flexible adaptation strategies are developed, and measures are implemented step-by-step where possible. Simply waiting around for improved information might appear to be a good idea for saving money today, but the result of inaction would be significantly higher costs in the future – with the costs increasing by as much as hundreds of billions (Stern Review on the Economics of Climate Change).



*Nature is under threat from climate change in developing countries.*

### **A quality initiative**

Adaptation to climate change requires new methods for preparing, implementing and monitoring investments. These range from the evaluation of climate forecasts to vulnerability analysis, from risk assessment to the development of indicators of successful adaptation. KfW is also developing new types of adaptation projects and programmes. In addition to so-called "no regret" measures, i.e. measures which make good sense even without climate change while at the same time supporting adaptation, such as erosion protection in agriculture, KfW is promoting specific adaptation projects on behalf of the German Government.

These include e.g. coastal protection measures, projects to set up early warning systems, cyclone protection structures and buildings, or the adaptation of agricultural production systems.

### **International adaptation initiatives**

In the Cancún climate negotiations, adaptation was elevated to an equally important climate change target alongside emissions reductions. In the medium to long-term, the newly agreed Green Climate Fund is set to take on a very important role for the financing of climate-related projects, as a "significant" proportion of the additional multilateral adaptation finance

is to be routed via this fund. The actual design of the fund is still under discussion.

In international funding for climate adaptation measures, the World Bank with its Pilot Program for Climate Resilience (PPCR), the Adaptation Fund (AF) under the Kyoto Protocol and the Global Environment Facility (GEF) are to be highlighted. The PPCR, which was founded in 2008 (total commitment to date: USD 1 billion) under the umbrella of the World Bank Climate Investment Fund (CIF), is being implemented via the five large multilateral development banks that offer grants and loans. By contrast, the AF only awards grants.

### Promotional instruments used by KfW Entwicklungsbank

KfW Entwicklungsbank places the extensive expertise it has gathered from years of development cooperation at the service of climate adaptation. It offers support to project partners on the planning and design of their climate-sensitive projects according both to latest scientific knowledge and KfW's own long-standing experience of development policy. On behalf of the German Government it also provides grants and loans at subsidised interest rates for adaptation measures. Loans are e.g. often provided for investments in water supply and sanitation in residential areas for projects which are suitable in terms of economic sustainability. Within the framework of the political guidelines of the German Government, KfW aims to have a differentiated, country-specific portfolio of grant and loan financings tailored to the conditions and performance capabilities of the country, sector and project. The pilot projects which have already been developed reflect this approach (see pages 15, 23, 24).

For selected countries the promotion of sector programmes (policy based lending), e.g. in the area of water supplies, is also possible. In the process, it is vital to closely coordinate climate policy and development planning with each other. Indicators for attaining sector targets, e.g. the efficiency of water usage, must allow for clear impact measurements. These are a prerequisite for supporting the programmes.

In addition, in individual cases KfW Entwicklungsbank also may support national adaptation funds via co-financing measures. Comparable financing is already taking place in the forest protection sector with Brazil's Amazon Fund. The country-specific conditions and opportunities for implementation in the partner country are important success criteria for designing and selecting a potentially suitable fund.

*Modern irrigation systems are the foundation of a functioning agricultural sector.*



# PROJECTED CONSEQUENCES OF CLIMATE CHANGE

## KFW RIVER BASIN SNAPSHOTS AS A BASIS FOR PROJECT RECOMMENDATIONS

So what exactly does climate change mean for people in developing countries? On behalf of the Federal Ministry for Economic Cooperation and Development (BMZ), KfW Entwicklungsbank has developed so-called "River Basin Snapshots" – documents which describe the consequences of climate change in selected river basins and highlight existing and potential new adaptation measures.

The snapshots initially compare projected climate change with past climatic developments and assess the changes in the context of other factors like population growth and land use. In addition, the reliability of the forecast models is critically assessed. The snapshots also describe the institutional responsibilities for adaptation to climate change in the water sector in the individual countries. Furthermore, they also offer an overview of existing and planned adaptation activities by national organisations as well as bilateral and multilateral organisations.

The snapshots which have already been published address the Upper and Middle Niger in Western Africa, with a focus on the countries Burkina Faso, Guinea, Mali and Niger, as well as the Kura and Aras river system in the Southern Caucasus (Armenia, Azerbaijan and Georgia) and the Rimac River in Peru. These cases show that the effects of climate change vary greatly in different regions. Melting ice in the Peruvian Andes might have an impact on the water supplies for Lima, while the influence of climate change on the Upper Niger is still unclear and – in comparison to other factors – probably not decisive in terms of development. By contrast, in the Southern Caucasus climate change could worsen already existing bottlenecks in the water supply – as a result key importance is placed on cross-border river management. In cases where the developments are uncertain, "no regret activities" are recommended which make sense even without climate change.

*In the Caucasus, climate change is set to worsen existing water shortages.*



# ADAPTATION TO CLIMATE CHANGE IN THE SAHEL

## COOPERATION WITH THE WEST AFRICAN DEVELOPMENT BANK

In many regions in Western Africa people suffer from the effects of droughts and heavy rain events, which could increase as a result of climate change. At the end of 2010, KfW Entwicklungsbank signed an agreement with the West African Development Bank (Banque Ouest Africaine de Développement, BOAD) which secures long-term financing to support its development policy tasks in the field of adaptation to climate change. BOAD has the role of promoting the countries in the West African Economic and Monetary Union (Union Économique et Monétaire Ouest Africaine, UEMOA) and the economic integration of Western Africa.

A portion of the "fast start funds" committed by the German Government during the Copenhagen Climate Summit in 2009 will be used for the programme.

KfW is providing BOAD with grants from the German federal budget, which BOAD then uses to offer particularly favourable loans to the governments of its member states Burkina Faso, Mali, Niger and Senegal for climate adaptation projects. The funding grant from KfW of some EUR 10.6 million enables BOAD to offer low-interest loans for climate adaptation measures totalling a projected amount of EUR 60 million – an innovative funding mechanism. Projects in the climate-related sectors of agriculture and natural resources management, as well as the areas of drainage and flood protection will benefit from the funding. They are initially to be used to expand bilateral programmes which are already up and running, e.g. in the agricultural sector.

In addition, there are plans for scientific cooperation between BOAD and established regional research institutions to measure and assess the impact of the climate adaptation measures introduced in the Sahel Zone under the programme. At the same time, the West African Development Bank will define

its role in more detail for the implementation of the National Adaptation Programme of Action (NAPA) and examine how it can best become involved in monitoring the effectiveness of these action plans.

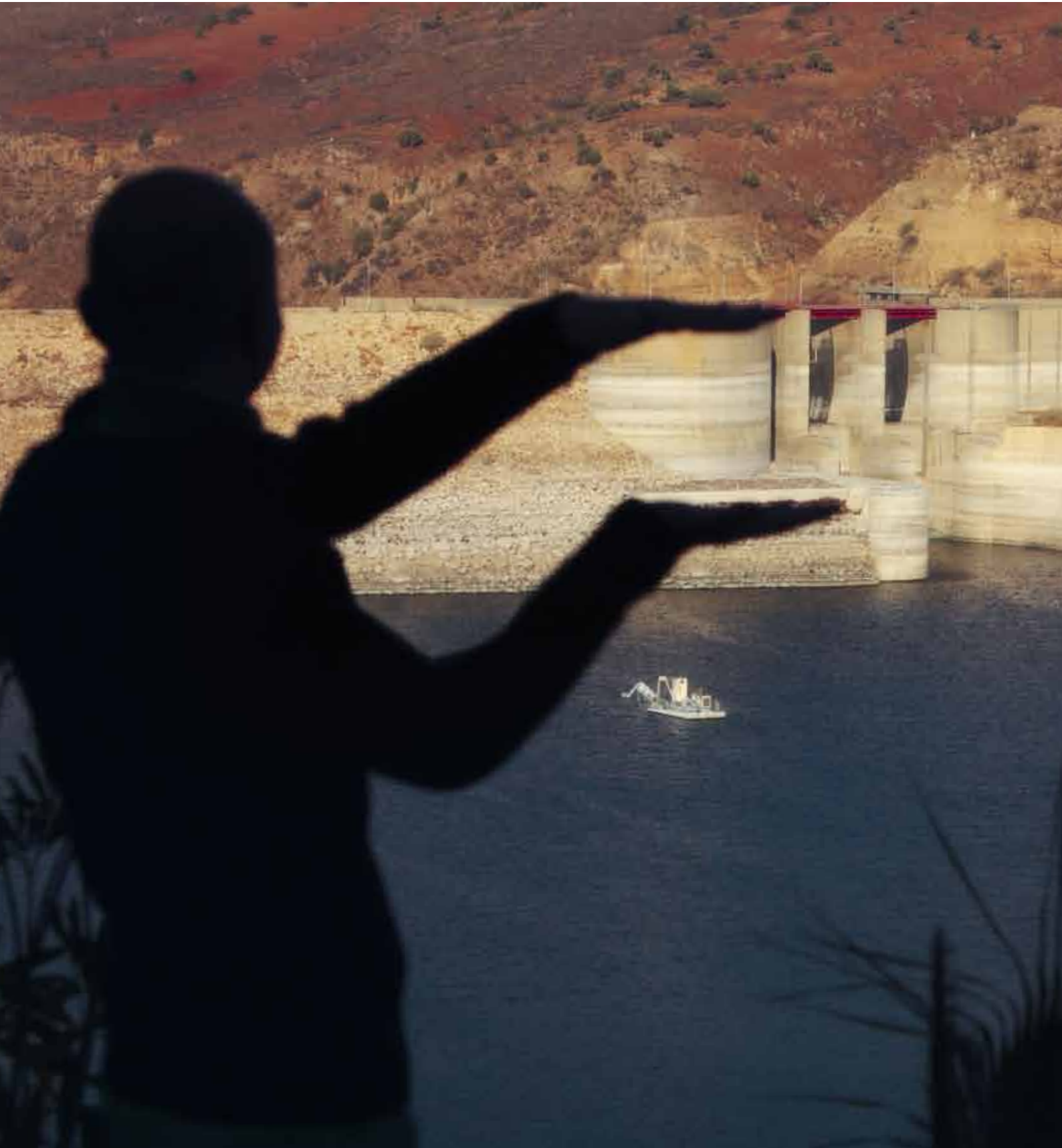
*Deep wells are becoming increasingly important in the Sahel Zone.*



# LIMITING RISKS – EXPLOITING OPPORTUNITIES

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CONCRETE ADAPTATION MEASURES – KFW'S CONTRIBUTION





**The aim of adaptation measures is to limit the consequences and risks associated with climate change and also take advantage of any opportunities which present themselves. In essence, the primary concern is to protect the life and health of people, safeguard the economic and socio-cultural basis of livelihoods as well as preserve the ability of ecosystems to function effectively, thereby contributing to sustainable and long-term development. The diversity of the goals is matched by the diversity of concrete approaches and possibilities for adaptation.**

In most development projects, adaptation to climate change is not the main objective. In order to ensure that the desirable impacts in terms of development policy are not put at risk by climate change and potential opportunities are exploited, it is important to take into account mutual interdependencies and consistently integrate adaptation measures. Within the framework of its sustainability guidelines, KfW Entwicklungsbank subjects all new projects to climate change assessments. Thanks to the binding nature of this innovative instrument, all activities are comprehensively analysed in terms of the special requirements and courses of action relating to adaptation (refer also to the "Climate change assessment" on page 19). Specific adaptation projects must satisfy the given special needs for adaptation. They promote innovative approaches which also accelerate the process of gathering knowledge and help to establish and refine best practices.

A systematic analysis of the risks and opportunities associated with climate change always forms the basis for the planning and implementation of adaptation measures. KfW supports its partners in their efforts to gather the required climate information and to draw up regional climate studies.

In order to accomplish this, not only are historical weather data utilised, but the results of climate models are also used to gain a better idea of the climate changes expected in the future. Reliable indicators of expected climatic changes then make it possible to draw conclusions about where adaptation to climate change is expedient or even urgently required. This is exactly where adaptation measures can be applied.

#### **Diverse areas of action**

There is a need for action in terms of adaptation to climate change in almost all fields of activity in which KfW supports development processes in developing countries and newly emerging economies. Important areas of action which are particularly affected by climate change are without doubt water and natural resources management, agriculture and safeguarding food supplies, but also healthcare and disaster prevention (see pages 28–29).

For example, KfW promotes the reuse of treated wastewater in areas with increasing water shortages (e.g. in Jordan) or water-saving technology (e.g. in Mexico), supports efforts to rehabilitate and improve the efficiency of irrigation systems (e.g. in Egypt, Tunisia, Ecuador) and promotes the construction of additional small and medium-sized irrigation systems (e.g. in Peru, Bolivia). It finances agricultural production systems that conserve soil and water, such as simple terracing systems, and approaches to use rainwater in Niger and Burkina Faso or no-till farming in Paraguay. In the field of disaster prevention, KfW supports, among other things, measures to improve dykes but also projects to plant mangroves for tackling the increasing coastal erosion in Vietnam for example.

Infrastructure measures in particular require intensive assessment – whether for the construction of schools, health centres, hydroelectric power stations or irrigation channels – as infrastructure is expensive and generally is in use for a long period of time. Climate change can directly endanger infrastructure, e.g. due to rising sea levels, severe storms or through floods or mudslides. Climate change can also have an indirect impact on the operation and commercial yield of plants. The best example for this is wind power turbines, whose economic efficiency is defined to a large extent by existing wind conditions. Consequently, during the planning of infrastructure projects KfW always considers whether a site is suitable for a planned investment in terms of potential climate change, and assesses when and to what extent impacts can be expected on the operation and

maintenance of the infrastructure object. Together with the project partners, these aspects are systematically developed, discussed and integrated in the conceptual design of a project.

#### **An integrated approach**

However, adaptation to climate change also requires new methods for preparing, implementing and monitoring the effectiveness of investments. The more vigorously forecasts of climate-related impacts can be tested and the more serious the risk of damage of projected impacts, the more important it is to consider measures which would not be implemented without the aspect of climate change. This applies in particular to the new challenges resulting from rising sea levels and increasing sea temperatures or from glacial melting.

Consequently, in addition to "no regret measures", KfW Entwicklungsbank will also increasingly focus in future on specific adaptation projects, e.g. coastal protection measures or technical precautions for reducing the risk of glacial lake outbursts.

This demands an integrated approach, during which KfW deploys a comprehensive range of climate instruments ranging from the evaluation of climate forecasts via vulnerability and risk analyses, to the development of indicators of adaptive capacity. At the same time, this approach helps to accelerate the process of gathering knowledge at KfW and its partners, and allows new approaches to be developed in the conceptual design and implementation of adaptation projects.

*Mangroves help to provide protection against erosion.*



## The two-stage climate change assessment

### Systematic analysis of all risks and potential

All KfW Entwicklungsbank projects are subjected to a systematic climate change assessment. This assessment makes sure that the intended effects are not endangered by climate change and that any arising opportunities are utilised. The climate change assessment is performed in two steps. In the first step, an initial assessment is made to roughly gauge whether the planned project is at significant risk of being adversely affected by climate change, or whether there are any opportunities to exploit climate change impacts to the advantage of the project. The assessments only proceed to the more detailed second stage if the initial assessment offers some indication that the project is relevant to climate adaptation.

### Screening

The screening establishes whether there is any indication that a project depends to a significant degree on climate parameters, e.g. wind or precipitation. It also checks whether the adaptive capacity (resilience) of the people or ecosystem can be significantly increased. The resilience of a target group is increased if it can subsequently better handle the effects of climate change or is more capable of protecting itself against these effects. For example, the resilience to rising sea levels can be significantly increased by constructing protection systems or by adapting land use. An initial overview of expected climatic developments in the region of the project and possible consequences of such changes is designed to clarify to what extent adaptation is needed. This also includes follow-on effects, such as loss of income or health risks due to malnutrition.

The climate change assessment will end at this point if – and only if – the screening shows that no significant impact on the project is expected based on the projected climate data and that there are also no significant opportunities to increase adaptation capacities. In the remaining steps KfW acts according to the precautionary principle: whenever there is significant uncertainty about the future climate or its effects on the project, a case-specific in-depth adaptation assessment is performed. For example, projects which depend upon the availability of water – such as irrigation systems or drinking water supplies – require a more in-depth assessment if there is any indication that the water balance is set to change.

### The in-depth assessment

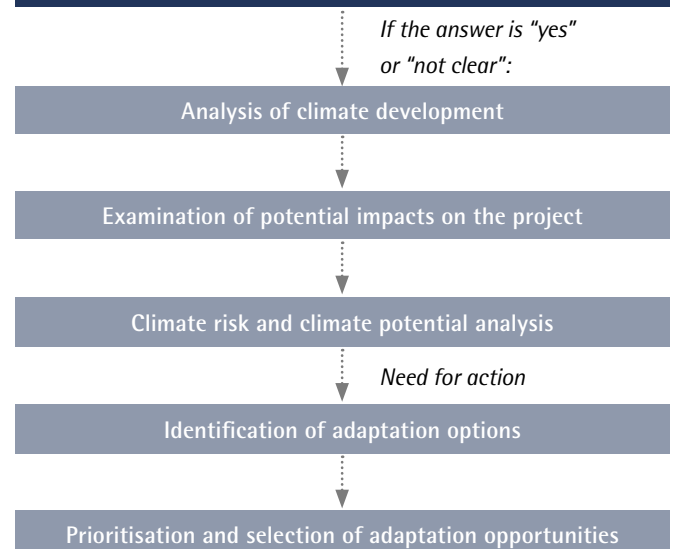
The in-depth assessment starts with a complete (as far as possible) compilation and analysis of the information about the past, current and projected future climate development. In a second step, impact chains are used to examine the effects that climate change could have on the project. The outcome of this type of analysis of climate risks and opportunities of climate change is then whether – as a result of unacceptable risks or also due to potential which can be exploited – there is additional need for action in the form of adaptation measures. The adaptation activities identified in this way are integrated into the project as well as into the further phases and the monitoring and evaluation process. This makes the project "climate proof".

### KfW Entwicklungsbank climate change assessments

*Screening*

1. Is there a significant dependency on climate parameters?
2. Is there a significant potential for increasing resilience?

*In-depth assessment*



# MODERN TECHNOLOGY AND TRADITIONAL

## INTERVIEW WITH DR LUIS FERRATÉ FELICE



*Dr Luis Alberto Ferraté Felice was Minister of Environment and Natural Resources of Guatemala in the administration of Colom Caballeros until June 2011. He was elected Chairperson of the eighteenth session of the Commission on Sustainable Development. He holds a degree in Environmental Engineering from the University of San Carlos of Guatemala and a PhD in Geography from the University of Oregon, USA. Dr Ferraté is the author of approximately 30 publications on environmental issues.*

### **Minister Ferraté, how will climate change affect Guatemala?**

In Guatemala we have two big problems: poverty and climate change. Fighting poverty is made more difficult by unfair income distribution. Climate change acts as a multiplier. Guatemala lies in a corridor between the Atlantic and Pacific. We are located in the path of tropical storms whose intensity is increasing through climate change.

### **How severe are these weather extremes?**

In 1998 we had Mitch, in 2005 Stan and in 2010 Agatha – all tropical storms with disastrous consequences. The damages totalled about EUR 6.5 billion. Agatha alone claimed 96 lives and we had to evacuate 330,000 people. A country confronted with such damage in such a short time can scarcely develop – climate change becomes a constraint. In addition there were the droughts of 2002 and 2009, which caused damage that can not yet be quantified. The collapse of agricultural sectors leads to severe famine and to migration to the cities and abroad. Instead of investing in development, we are forced to repair damage.

### **Guatemala has passed a climate strategy and a national climate plan. Which concrete measures have been derived?**

Yes, we have created the political framework you mentioned. We have passed a programme for managing coastal and ocean areas. We have established an inter-ministerial commission on climate change, which is led by the vice president. 14 months ago we presented climate change legislation to the Congress. We have passed a law on environmental education, which specifies that teachers must be explicitly trained on the topics of emission reduction and adaptation to climate change. We are currently

establishing a national climate change fund. We have increased capacities in the Ministry of Environment and in the authorities for national protected areas.

### **How do you determine adaptation priorities?**

We focus on the population groups that are the most vulnerable for which we apply two indices. First, the index for human development and poverty on the municipal level. This data comes from the National Statistics Office. Second, a vulnerability index we developed based on Intergovernmental Panel on Climate Change (IPCC) methodology. Using this index we have identified 84 municipalities as especially endangered.

The main focus is on the arid corridor which makes up about 15% of Guatemala today but is growing. Furthermore, the slum areas of the large cities are particularly vulnerable. In addition we use data from the National Coordination Office for Catastrophes, which has created a map of the country's risk zones. Climate change for us is not only a political problem, it is a challenge for national security.

### **The Guatemalan climate strategy also mentions mobilising the traditional knowledge of the country to help in adaptation to climate change. What is meant by this?**

For example, we have asked the Global Environmental Facility (GEF) to support our programme for activating indigenous knowledge. We are especially interested in how people dealt with dry periods and floods in the country's past. Particularly important here is food security and adaptation of agricultural and forestry practices. We also focus on the knowledge regarding how to treat "mother Earth" in a harmonious manner overall.

# KNOWLEDGE ARE NEEDED

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## **Which areas are particularly important in terms of international cooperation for adaptation to climate change?**

Since 1992 we have been investing in reforestation and erosion protection. And at the same time we are trying to consolidate and expand the system of protected areas. These areas are particularly important as they act as barriers against the negative effects of climate change.

A second area is water supply and integrated water resources management. We are working with mathematical models which forecast that the amount of available water in Guatemala will decline by 9 to 19% in the next 50 years. The average temperature is forecast to increase by 1.5 °C. In light of these scenarios we are striving to manage our watersheds efficiently and strengthen the water retention systems on the municipal level.

I am very grateful to the German government: on the one hand it was extremely important for us to attain a debt swap for the benefit of environmental programmes. This allowed us to mobilise additional international cooperation. The cooperation with KfW in the arid corridors is also of incalculable value. In both cases, German cooperation played a key role in mobilising additional resources for adapting important regions to climate change – whether in the form of grants or loans. That is why I feel the cooperation with KfW serves as a catalyst.

## **In what ways can a small country like Guatemala influence the international climate change negotiations?**

Guatemala is part of the Central American Integration System (SICA). We have always focused on cooperation with our neighbouring countries and worked towards speaking with one voice in the international climate change negotiations.

In Cancún we achieved important progress in adaptation as well – not least because of the important role played by Mexico. The topic of adaptation has drawn more attention – previously the negotiations concentrated primarily on the reduction of greenhouse gas emissions. We took a great step forward, but important decisions still have to be made. We are working to give the new Green Climate Fund a strong adaptation focus. Regarding the next climate change negotiations, we are in especially close contact with Brazil so that we can go to Durban with a common Latin American position.

# ADAPTATION TO CLIMATE CHANGE

## EXEMPLARY SOLUTIONS

### Insurance solutions for damage caused by climate change

#### A contribution to safeguarding development

Globally, climate change is leading to a clear increase in the frequency of droughts, violent storms, record temperatures, floods and hurricanes. In 2010 alone, 950 weather-related natural catastrophes were recorded resulting in the loss of 300,000 lives. The reported economic damage is estimated at around EUR 97 billion. This means that the number of storms and the damage caused by storms has doubled globally in the last 20 years. And this is a trend which is set to continue. According to UN calculations, global warming of 1 °C will result in a more than 30% increase in the annual number of destructive hurricanes around the world.

Many developing nations are situated in climate zones which are at particular risk from these increased severe weather events. In addition, measured against their economic output they also suffer higher losses than richer countries. The reasons for this include the still inadequate early warning systems, underdeveloped natural disaster protection

and the increased susceptibility of infrastructure to extreme weather events.

In addition, private households, companies and public institutions often have no access to insurance services which would enable them to better deal with the unavoidable economic consequences of such weather-related natural catastrophes.

Adequate insurance solutions against the consequences of climate change could make a contribution to safeguarding development successes and prevent a rise in poverty after weather-related natural catastrophes.

As a result, in the Bali Action Plan the 2007 UN climate conference called upon donors, development finance institutions and private insurance companies to jointly develop adequate insurance solutions against the consequences of climate change.

One building block here is the experience gained through initial pilot projects such as the Caribbean Catastrophe Risk Insurance Facility (CCRIF) or the drought insurance for

Ethiopia. With the assistance of the World Bank, the CCRIF, which was founded in 2007, offers insurance policies to 16 countries in the Caribbean against natural disasters (such as cyclones in particular). The Ethiopia Drought Index Insurance (EDII) is an insurance which is sponsored by the World Food Program and the United States Agency for International Development (USAID). In the event of crop failures in Ethiopia caused by periods of drought, it secures quick payment of the insured amount to the Ethiopian programmes which are entrusted with aid measures. The pilot projects show that public private partnerships can enable the creation of effective insurance solutions against extreme weather risks caused by climate change. Here, development finance institutions like KfW can make available equity capital, contingent loans or credit enhancements for climate insurance products. In addition, they can also provide the accompanying technical assistance necessary for the development of adapted insurance services, so that insurance policies become an effective part of the climate change adaptation strategy of developing countries.

*Climate insurance can help limit the economic damage caused by flooding.*



# CLIMATE CHANGE ENDANGERS AGRICULTURE

## AN IRRIGATION PROGRAMME IN BOLIVIA



*Efficient irrigation helps farmers to survive in high-altitude regions of Bolivia.*

Most climate forecasts expect the quantity and distribution of precipitation to change in Bolivia – to the disadvantage of agricultural production. Water shortages will particularly affect medium and high altitudes (above 3,000 metres above sea level), while the lowlands, e.g. near the country's most densely populated city of Santa Cruz, are more likely to be at risk of flooding.

Agriculture is by far the largest single water user in Bolivia. Of the country's 5,000 irrigation systems, more than half are managed by 200,000 predominantly poor small-scale farmers. Recent studies have come to the conclusion that efficient water management and increased storage capacity could significantly increase the resilience of the rural population to climate change. Present water

usage efficiency is between just 20 and 40%, so the bulk of the water simply drains into the ground or evaporates.

With its support, the German Government is aiming to counteract the effects of climate change by investing in water storage systems and improvements to the efficiency of irrigation systems. The programme, for which KfW has committed a total of EUR 18 million, is designed to benefit the poorer rural population in particular. The scope of potential investments ranges from the construction and rehabilitation of small dams and water channel systems, to the restructuring of small-scale farming production systems by using water ditches, to sprinkler irrigation and drip irrigation and even an expansion of water harvesting and collection systems.

The research component accompanying the programme is designed to help improve the methods used to prioritise investments, to plan and implement irrigation measures and to provide monitoring from the point of view of climate change. The programme is being carried out in close cooperation with GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit).

# INVESTMENT IN EROSION PROTECTION AND CLIMATE INSTRUMENTS

## A PROGRAMME FOR THE RURAL POPULATION IN INDIA



*The poor rural areas in northern India are particularly reliant on adaptation measures.*

A programme proposed by the states of Assam, Meghalaya, Sikkim, Nagaland and Mizoram is designed in particular to strengthen the resilience of the rural population in the poor northeast of India. On behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), KfW Entwicklungsbank is providing funding of up to EUR 76 million. The Financial Cooperation is supplemented with technical consultancy provided by GIZ.

A team of scientists has developed a specific vulnerability analysis for the northeast of India on the basis of data relating to soil conditions, infrastructure and socio-economic factors (e.g. poverty indicators) in

conjunction with historical and projected climate data. As a result, criteria and parameters are now available to prioritise districts in the programme area according to the vulnerability of the population groups and sectors. The investment projects submitted from the region in the field of climate change adaptation can be selected and financed at government level (central government and union states) within this framework according to clearly defined criteria.

Specifically, measures including reforestation, flood and erosion protection, springwater protection and water storage systems are promoted under the umbrella of the programme at local level. The programme also

offers a cross-sector framework through the development of an innovative climate change adaptation planning instrument, and as a result it has created a best-practice example which is relevant to international climate discussions beyond India.

At the same time, the programme pursues the aim that – regardless of the climate scenarios – the adaptation projects which are financed should immediately deliver positive effects in terms of development policy. In addition, they should also always help the people to increase their resilience and adaptive capacity to adjust early on to gradual or abrupt changes to the climate.



# WATER RISK FILTER FOR COMPANIES

## A PROJECT FROM DEG AND WWF

In many developing countries, climate change is also causing further shortages of water resources. This makes it all the more important to carefully use this resource – which is vital for industrial and agricultural production – and deal appropriately with water risks.

Acting as a financier and consultant to private companies investing in these countries, DEG (Deutsche Investitions- und Entwicklungsgesellschaft mbH) worked together with the conservation body WWF to develop a methodological filter which financial institutions and other investors can use to identify and assess the water-related risks of their customers, so that in turn this information can be used in investment decisions.

In the pilot phase for the development of the filter, information on water consumption, monitoring processes, operational management and regulation was obtained from 48 project companies with 65 production locations of DEG's project portfolio. Another source of data for the filter are the newly created datasets for 85 countries in which DEG customers are active. Every set comprises a detailed description of the water situation in the country and a model based on 33 water indicators.

The filter highlights both company-specific water risks as well as the risks attached to the relevant water catchment area (basin) in which the company is located. In addition to risk information, it also delivers approaches for improvement measures. Comprehensive maps are used for visualisation purposes. Around 57% of the surveyed DEG customers have company-specific risks, while nearly half are situated in water catchment areas with potentially high risks.

In the next step, concrete improvement approaches are implemented in cooperation with the DEG project companies. There are plans to develop region-specific and sector-specific measures on the basis of existing better and best practices with the aid of a so-called "mitigation tool box". In addition, consultancy projects for improving water efficiency or optimising the water situation in the catchment area are under preparation, including for the agriculture sector in Kenya.

The water risk filter will also be made available to other funding institutions for their customers. In this way, WWF and DEG are helping to improve the awareness of ecological and economical water risks, and to improve the water management of companies investing in developing countries .

*Investments in the water treatment infrastructure are needed.*



## Risk management for natural disasters

### An integral part of climate change adaptation

Natural disasters are classified into events with geophysical, meteorological, hydrological, climatological and biological triggers. The number of documented natural disasters is increasing as a consequence of inadequate adaptation so far to date to climate change which has already taken place, growing population densities and the spread of settlements into unsuitable terrain, but also due to improved data acquisition methods and increased international networking. According to statistics provided by the Emergency Events Database (EM-DAT) on natural catastrophes, the years 2000, 2002 and 2005 had the largest number of recorded natural disasters worldwide since 1900.

During the period from 1991 to 2005, the number of natural disaster events caused by hydrometeorological triggers was placed at 1,532 in Asia, 1,072 in America and 607 in Africa.

Of these hydro-meteorologically caused natural disasters, it is particularly floods (1,694) and storms (1,281) which not only occur with the highest frequency, but which also result in the highest number of fatalities and cause most of the economic loss. For 2010, one example of this is the flood disaster in Pakistan, which affected more than 15 million people.

One of the main reasons for the extent of damage is the high vulnerability of the less developed subtropical nations in particular. This makes it all the more important to limit the potential impact of extreme weather events within the framework of disaster risk management for natural disasters

(DRR, Disaster Risk Reduction) by increasing the resilience of a society and its economy, and reducing its vulnerability.

DRR should be seen as an integral part of climate change adaptation. Methods and instruments for risk and vulnerability analysis are key issues according to a study carried out by the German Committee for Disaster Reduction (DKKV) in 2011. Other important aspects include early warning systems with disaster preparedness strategies for the directly affected population, as well as improved framework conditions so that synergies of DRR and climate change adaptation can be effectively used. A conceptual framework for disaster preparedness is provided by the Hyogo Framework of Action on Disaster Reduction (HFA – adopted by 168 governments in 2005) and the associated international dialogue on disaster reduction (UN International Strategy for Disaster Reduction, establishment of national DRR platforms).

For example, in the Indian state of Orissa, which is frequently struck by cyclones, KfW Entwicklungsbank has financed in cooperation with the German Red Cross the construction of safe buildings and the establishment of disaster management structures, emergency response training and the installation of an early warning system.

A special new challenge for early warning systems and preparedness strategies is the integration and monitoring of combined effects from the gradual consequences of climate change (e.g. rising sea levels in the coastal regions of Bangladesh and Vietnam) and sudden catastrophes (e.g. typhoons, extreme monsoon rain events).

# INCREASED WATER SHORTAGES AS A RESULT OF CLIMATE CHANGE

## ADAPTATION MEASURES IN JORDAN



*A carefully managed approach to water shortage leads to measurable successes.*

With a per capita water availability of just 145 m<sup>3</sup> per annum (the equivalent figure for Germany is around 1,900 m<sup>3</sup>), Jordan is one of the world's most arid countries. This water shortage, which is exacerbated by a number of factors, leads to supply bottlenecks. The waves of refugees from neighbouring Palestinian regions and Iraq have swelled the population of Jordan from below 1 million to more than 6 million in the last 50 years.

The increase in demand has resulted in severe depletion of groundwater. In most parts of the capital Amman, water only flows from the taps once or twice a week, meaning that the people here are forced to store the water in tanks in between.

This is made worse by the high water losses of around 40% in the drinking water supply systems in Amman, which is mainly due to dilapidated distribution networks.

Climate change poses an additional threat to scarce water resources. Particularly in the densely populated northwest of Jordan it can be expected that total annual precipitation will see a further drop by the middle of the century. Records also confirm the declining rainfall trend in the recent past.

On behalf of BMZ, KfW Entwicklungsbank is supporting Jordan with a range of different activities which are designed to help the country adapt to the increasing water shortage; for example, water losses are being reduced in Amman by means of programmes of German Financial Cooperation. The water losses which can be avoided by replacing small supply pipes and domestic connections can provide up to an additional 200,000 people with water.

In addition, KfW is also promoting the reuse of treated wastewater in agriculture. Wastewater from the region of Irbid in northern Jordan is purified and then pumped to the neighbouring Jordan Valley, which is dominated by agriculture. Here, the water is further processed and then used for irrigation. KfW Entwicklungsbank is currently also assessing investments for improvements of hydrological and meteorological measurement networks to further improve the data basis for climate change adaptation.

# WORLDWIDE COMMITMENT

## ADAPTATION TO CLIMATE CHANGE: EXAMPLES OF CHALLENGES AND SUPPORT APPROACHES

### Increasing weather extremes and declining precipitation in Northern Africa

*KfW supports efficient water usage in cities and in agriculture, as well as coastal protection measures. It is also investigating the introduction of an early warning system for floods and desalination of sea water.*

### Increasing variability of precipitation in Western Africa

*KfW promotes small-scale irrigation and water and soil preservation measures.*

### Increasing climate variability in Central America

*KfW promotes the stabilisation of ecosystems – among other things through improved management of water catchment areas.*

### Seasonal water shortages due to glacial melting in the Andes

*KfW supports measures to increase irrigation efficiency and reduce water losses in the cities.*

### Amazon's biodiversity under threat from climate change

*KfW supports improved management of protected areas.*





**Increasing aridity in the Middle East**

*KfW promotes the protection of groundwater reserves, the reduction of water losses in towns and cities, as well as the reuse of treated wastewater.*

**Increasing desertification in Eastern Asia**

*KfW is supporting reforestation projects in China and projects for sustainable management of pasture land, as well as for the renaturation of rivers and forests for safeguarding urban drinking water supplies.*

**Rising sea levels in Southeast Asia**

*KfW is supporting coastal protection measures and mangrove protection measures (in preparation).*

**Increasing climate variability in South Asia**

*KfW is supporting states in the north-eastern part of India in promoting adaptation measures, including in agriculture.*

- Partner countries of Financial Cooperation on behalf of the German Government
- Regional offices of KfW Entwicklungsbank and DEG

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KfW Bankengruppe  
Palmengartenstrasse 5-9  
60325 Frankfurt am Main, Germany  
Phone +49 (0) 69 7431-0  
Fax +49 (0) 69 7431-2944

KfW Entwicklungsbank  
Phone +49 (0) 69 7431-4260  
Fax +49 (0) 69 7431-3363  
info@kfw-entwicklungsbank.de  
www.kfw-entwicklungsbank.de

DEG – Deutsche Investitions- und  
Entwicklungsgesellschaft mbH  
Kämmgasse 22  
50676 Cologne, Germany  
Phone +49 (0) 221 4986-0  
Fax +49 (0) 221 4986-1290  
info@deginvest.de  
www.deginvest.de

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