



# Climate Change and Security

Challenges for German Development Cooperation

**gtz**

On behalf of:  
 Federal Ministry  
for Economic Cooperation  
and Development

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## Foreword: Climate change and security

The Intergovernmental Panel on Climate Change and other scientific authorities have left no doubt as to the dimensions and significance of the negative consequences of climate change – in particular in developing countries. Societies with a low capacity to adapt are also the most vulnerable.

The growing potential for conflict associated with climate change and the resulting rise in insecurity in society are increasingly a subject of discussion. Environmental stresses caused by climate change exacerbate competition for soil and water resources; they place high demands on disaster risk management and on planning and systematically prioritising the allocation of limited public funds. Furthermore, there is the threat of new regional and international crises and conflicts as well as the escalation of existing clashes over local resources.

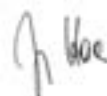
Such conflict scenarios, aggravated by the impacts of climate change, appear more likely today, but as yet not enough research has been carried out into their causes, forms and scale. These scenarios are generally very context-specific and their complexity is often obscured by the adoption of a particular sectoral or technical perspective, and thus unduly simplified.

In contrast, the authors of this study pursue an approach that explores both sectoral and regional connections between climate change, its effects and the resulting potentials for conflict and security risks. Moreover, they do not stop at an analysis of the status quo, but develop proposals that help orient the actions of German Development Co-operation – ranging from policy design to implementation. The study thus provides an important contribution for the debate on the role of German Development Co-operation in this field.

We hope that the study will have many interested readers and generates a lively discussion with regard to the opportunities for and limits to concrete implementation options in developing countries.



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# *Summary*

The latest review of climate science by the Intergovernmental Panel on Climate Change (IPCC) paints a picture of the regional impacts of global climate change that is in some respects dramatic. It is the societies with weak adaptive capacity which are most severely affected. The analysis by economist Nicolas Stern of the linkages between economic development and climate change comes to similar conclusions. Furthermore, studies such as the latest annual report of the German Advisory Council on Global Change (WBGU) and that by the US Center for Naval Analyses (CNA) postulate mounting conflict potential and an increase in social tensions driven by climatic changes.

The German Technical Cooperation (GTZ) therefore commissioned Adelphi Consult to assess the impacts of climate change on conflict and security from a development policy perspective and to formulate proposals for ways to further address this issue area in German development cooperation. The key findings of the report can be summarised as follows.

It now appears questionable whether global warming can be limited to the “safe level” of 2°C. For one thing, the concentration of greenhouse gases already reached in the atmosphere has set in motion a certain degree of unavoidable climate change. For another, there is a risk of unexpected feedback effects which may further accelerate change. It follows that, in addition to preventing climate change, there is a need to adapt to unavoidable change – a need that will become ever more urgent in the future.

Climate change will lead to resource scarcity and environmental degradation over the long term. This can heighten existing social and political tensions or can lead to new ones. State institutions already overstretched will come under additional pressure, and will find it increasingly difficult to perform elementary state tasks. Combined with growing environmental stress, this will impact the adaptive capacity of societies adversely and will thus also limit their capacity to engage in peaceful conflict resolution. This means that an increasing use of violence to resolve conflicts could already be expected, as well as escalating security risks in the affected societies and in neighbouring regions. This is amplified further by an array of other global trends, notably rising levels of resource consumption due to economic development, population growth and urbanisation, which will make the adverse effects of climate change all the more manifest.

Specifically, the following sectoral trends have been identified:

- **Water:** Declining water availability leads to increased competition between users. At the same time, established hydrological patterns will dissipate, causing the risk of disaster to increase.
- **Food and rural development:** Food production will decline in many regions, which can cause the loss of food security. This leads to heightened competition for fertile land. Increasingly severe agricultural crisis drives uncontrolled migration to the cities, which may increasingly become social hotspots.
- **Energy, infrastructure and transport:** Key infrastructures, such as energy supply facilities, are impaired and can contribute to processes of socio-economic destabilisation. At the same time, declining levels of hydropower generation can further heighten competition over fossil energy sources. Moreover, the proliferation risks associated with nuclear power are growing. Destruction of infrastructure caused by extreme events and by sea-level rise can trigger migration movements and thus tensions in receiving areas.
- **Urbanisation:** The growing concentration of cities in coastal regions heightens disaster risks considerably. When a disaster occurs, there is the risk of collapse of public order, especially in megacities. Disasters in political and economic centres harbour particular political volatility. This is joined by adverse health effects which may emerge increasingly in the course of increasing urbanisation and growing slums.
- **Governance:** Additional overstretch of institutional governance structures in developing countries is a prime effect of climate change. This diminishes the capacity of societies to steer policy processes and hampers the performance of elementary state tasks. Particularly if disastrous events occur, there is an additional risk of the loss of legitimacy of state institutions. As a result, state performance in general and mechanisms of civil conflict transformation in particular are weakened. These issues aside, the development orientation of the states in question is key to effectively combatting climate change.

The interplay of sectoral developments in a setting characterised by the above global trends can even overstretch the adaptive capacity of relatively stable states. As climate change impacts upon all levels of social life, it can adversely affect the entire spectrum from human security to regional stability. Due to their geographical location, however, it is the fragile states and those already marked by conflict that will be affected first and most severely. Although regional problematics differ greatly and long-term forecasts are difficult, it is possible to identify a group of regions which will be affected increasingly from 2030 onwards. The present report has identified the following potential regional hotspots:

- **Middle East and North Africa:** Even without climate change, water availability will become the key problem of the region in the near future. This has far-reaching impacts upon agricultural production, and accelerates desertification and salination of the soil – climate change will further amplify this trend. The Nile and the Jordan will thus move to the forefront of potential water distribution conflicts. Moreover, the region is under further demographic pressure as a transit region for migration movements.
- **Sub-Saharan Africa:** Declining water availability and shrinking utilisable agricultural area, in combination with growing populations, will lead to social and political destabilisation in many countries. Sea-level rise will present growing challenges for the coastal areas of West Africa. The large number of simmering violent conflicts and post-conflict countries, combined with widespread governance insufficiencies and possible migration movements, threatens in the foreseeable future to cause the spread of a belt of crisis engulfing many countries, especially along the Sahel zone.
- **Asia and Pacific:** Sea-level rise, the intensification of extreme weather events and glacier melt in the Himalayas will greatly impair water supply and agriculture. In addition, sea-level rise and the increase of extreme weather events will threaten major river deltas in particular, which may lead to forced migration and displacement. An array of states that are fragile or destabilised by internal disputes is affected by these developments, notably Bangladesh because of the degree to which it is affected and Pakistan because of its security policy importance.

- **Latin America and Caribbean:** Here the influence of state fragility is limited, but uneven resource access combined with rapidly growing cities and declining governance capacities could greatly amplify the potential for conflict under the conditions arising due to climate change.

A crucial new quality of current climate change is its speed and extent. The matter is thus not one of individually occurring, monocausal crises and conflicts, but rather one of a great number of destabilising, mutually amplifying factors. The latest scientific findings make the spillover of existing, locally limited resource conflicts and the eruption of new regional and inter-state crises or conflicts appear increasingly plausible in coming decades. If preventive and adaptive strategies should fail, these developments will overstretch the global governance system as a whole and will thus entail far-reaching (global) structural policy or even geostrategic consequences. It is thus important to give the debate on the impacts of climate change upon security, conflict and governance a standing equal to the other climate change discourses already under way. In view of the long-term nature of changes in this field, there is not only a need but also a real opportunity for preventive policy action. The first step in this effort is to conduct a systematic political assessment of the problematique and its effects upon other fields of policy.

Although the role that climate policy can play in preventing crisis is increasingly being highlighted, there is not yet any consistent strategy at present for addressing the issues at national or international level. A limited number of institutions and stakeholders have only just begun systematically to address the development, foreign and security policy aspects of climate change. As a part of that effort, status reports and work programmes are currently being produced and, especially in the military sector, comprehensive programmes to analyse the risks arising from climate change impacts are being initiated. There is now a great window of opportunity for the Federal Ministry for Economic Cooperation and Development (BMZ) to position itself politically at the multilateral level. Three arenas of action will be particularly important for German development cooperation in the coming months:

1. At the European level, the Commission and the Council Secretariat are preparing a joint paper on climate and security. This process provides an opportunity for the European partners to agree a common approach.

2. The 2009-2010 work programme of the joint Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) working group on Fragile States and Conflict, Peace and Development Cooperation envisages including climate and security as one of its themes.
3. At international level negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) present an opportunity to cooperate with key partners to mainstream more firmly within the climate regime the issues surrounding adaptation to climate change. Feeding interlinkages between climate and security into ongoing negotiations would be counterproductive.

It is in this setting that the present report outlines an array of possible approaches and recommendations for German development policy. As the impacts of climate change are long-term in nature, it is essential to set developments on track within the coming five to ten years. To be effective, adaptation strategies need long-term planning and realignment. Moreover, rapid economic growth, mounting resource consumption and the associated capital investments will crucially determine the global emissions path over the next decades. It is therefore essential to link the climate protection dialogue systematically with questions of energy security.

In this endeavour, a strategic positioning of German development policy is critically important. This requires a definition of those elements of the debate which should be addressed as a priority from the development policy perspective. Following clarification of the political-strategic priorities, the portfolios of the implementing organisations of German development cooperation need to be reviewed separately and in depth with regard to their available instruments and country priorities and themes. The findings should then underpin any further consultations needed within the German federal government, especially concerning the question of which institutions are to lead the process in the arenas for action identified. Dialogue mechanisms with future principal emitters need to be developed. These mechanisms should address regional developments and the issues surrounding adaptation to climate change in weak and fragile states. Regarding the design of institutional approaches in international policy to address climate-induced conflicts, the concrete function of such institutions must be the prime concern, and the debate needs to centre accordingly on substantive issues. Abstract calls for reform and further deve-

lopment of UN institutions (Economic and Social Council, United Nations Environment Programme) fail to address the real problem; they neither help to attain objectives nor are they politically viable.

As prevention and adaptation need substantially longer lead times for strategy and programme planning, and mitigation measures and adaptation strategies will increasingly need to be implemented in a conflict-affected setting for which experience is yet lacking, the challenges outlined here make it essential that development cooperation actors orient their activities more towards the long term. This places high demands upon the sectoral programmes and policies of German technical cooperation in particular. Key sectoral themes are water, rural development and energy.

Specific sectoral responses and institutional-technical capacity building aside, it is essential that state action is geared to development and that governance issues are tackled. If governance is poor, socially exclusive or not geared to development, building purely technical capacities has scarcely any positive effect, as it benefits only limited parts of society. Here it is important to identify the drivers of change and pursue alternative approaches in order to gear actions to development and, where necessary, build legitimate governance structures “from the bottom up” through development-oriented civil society actors.

Refining impact assessment methods, integrating climate risks in sector strategies and programmes, and performing and evaluating country and regional analyses or scenarios all require close cooperation among relevant sector projects and programmes, as well as close international consultation and cooperation.

- In the spheres of climate change mitigation, crisis prevention, conflict transformation and disaster risk management, German development cooperation institutions have a great array of tried and proven strategies and tools for the analysis and development of adaptation strategies. These sectoral approaches should be harnessed and jointly refined, and fed into international debates.
- This interdisciplinary refinement of existing tools should lead to new, integrative approaches for the development and implementation of conflict-sensitive and climate-sensitive adaptation programmes. Such integrative approaches are needed, as climate-related adaptation program-



mes will increasingly have to be implemented in contexts characterised by fragile and conflict -affected statehood.

- The various conflict and security analysis and risk assessment tools must take account of climate change impacts. A principal aim in this regard is to identify, in an anticipatory manner, countries highly vulnerable to climate-induced conflicts and/or disasters.
- It is necessary to bundle knowledge and competence in the organisations and partner institutions concerned by means of coordinated methods of impact assessment and their application. In that endeavour, synergies should be tapped by means of donor coordination in order to build a comprehensive data base for complex regional and country analyses.
- In the medium term, regional priorities should be set in the field of adaptation so as to encompass fragile states and states in conflict and post-conflict situations. To do this, there is a need to build capacity in conflict and risk analysis and in climate vulnerability assessment.
- On that basis, the following work must then be performed systematically for the priority regions: Adjusting portfolios, reviewing programmes and projects as to their climate sensitivity, mainstreaming climate protection issues in poverty reduction strategies, conflict resolution and peacebuilding strategies, and integrating them within sectoral and cross-cutting environmental and sustainability strategies. In particular, efforts to promote sustainable energy systems aimed at ending energy poverty and reducing resource competition need to move ahead.

The complex causal chains and conflict constellations require integrative and consistent strategies, impact assessment methods and crisis prevention programmes which will need to be developed in consultation with other donors and with partner countries. The present report accordingly proposes pilot activities for selected states and exploratory regional studies. For these activities and studies, methods will need to be agreed within the OECD DAC, and implementation coordinated with other donors and partners.

To meet the many requirements, there is a need to upgrade climate-related development cooperation in terms of staffing and funding. Only with greater resources will the organisations responsible be in a position not only to perform the regional studies and the refinement of necessary methodologies proposed here, but also to develop and maintain the capacities needed to foster adaptation to climate change and the prevention of future climate-induced conflicts.

# *1. Introduction*



The latest review<sup>1</sup> of climate science by the Intergovernmental Panel on Climate Change (IPCC) paints a picture of the regional impacts of global climate change that is in some respects dramatic. It is often the societies with weak adaptive capacity which are most severely affected. The analysis by British economist Nicolas Stern of the linkages between economic development and climate change comes to similar conclusions. Furthermore, studies such as the latest annual report of the German Advisory Council on Global Change (WBGU) and that by the US Center for Naval Analyses (CNA) postulate mounting conflict potential and an increase in social tensions driven by climatic changes.

Climate change will lead over the long term to additional resource scarcity and environmental degradation, and may thus amplify or trigger social and political tensions, conflicts and security problems. The impacts of climate change will thus additionally impair the capacity of societies to transform conflicts in a constructive and peaceful manner, and will constrain the capacity of state institutions to deliver key services and ensure public order and stability. The eruption of new regional and inter-state crises and conflicts or the widening of existing, locally limited resource conflicts are scenarios that appear increasingly plausible. Should preventive and adaptive strategies fail, these developments will overstretch the system of global governance as a whole and will thus have far-reaching (global) effects in terms of structural policy and even geostrategic consequences.

The linkages among climate change, security and conflict are presenting a prototypical challenge in terms of the need to capture a complex set of issues that has previously scarcely been analysed from a development policy perspective, to assess its relevance and to launch a strategic dialogue among development cooperation (DC) institutions on how to tackle this issue area. For German development cooperation in general and for the Gesellschaft für technische Zusammenarbeit (GTZ – German Technical Cooperation) in particular, the challenge is to identify the trends and scenarios of anticipated changes and the resulting effects, and to assess these in development policy terms.

GTZ therefore commissioned Adelphi Consult<sup>2</sup> to conduct an assessment of the impacts of climate change upon conflict and security from the development policy perspective. To that end, the following discussion reviews and evaluates the latest findings of climate impact research and their interplay with current and potential conflict constellations as well as international security policy concerns. On that basis, the study goes on to formulate strategic starting points and specific recommendations for action on the part of German Technical Cooperation.

The approach is as follows:

- **Chapter 2** discusses, on the basis of the IPCC, Stern, WBGU and CNA reports, the linkages among climate change impacts and present or potential conflict constellations. The “new quality” of climate change as a factor of conflict is explored, as is the interplay with other global trends.
- **Chapter 3** analyses the impacts of climate change on key sectors in terms of conflict-specific and security policy aspects.
- **Chapter 4** concretises the findings of Chapters 2 and 3 for selected world regions. Biogeophysical, socio-economic and potentially ensuing security policy impacts are illustrated.
- **Chapter 5** finally elaborates points requiring action on the part of GTZ, as well as broader strategic deliberations for German development cooperation in general.

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1 The authors thank Claudia Oldenburg and Christiane Röttger for their critical review of and editorial input to a preliminary version of this study.

2 The study was written in summer and autumn 2007 and reflects political developments up to October 2007.

The selection of relevant studies, sectors, regions and stakeholders was agreed with GTZ and with the German Federal Ministry for Economic Cooperation and Development (BMZ) before starting work. The developments set out here are plausible scenarios that can be derived from the observable biogeophysical and social trends. It needs to be kept in mind, however, that the linkages between climate change and conflict are extremely complex and by no means follow one-dimensional cause-effect lines. Assessments identifying the conflict in Darfur as the first “climate war”, for instance, must therefore be viewed with scepticism. A one-dimensional view of this kind would not only misuse the real issues surrounding climate change as a rhetorical device, but could in the worst case contribute to freeing further regional instigators of conflict from their responsibility.

The debate on climate change and security is made up of several interlinking discourses. The threat posed to human security by climate change constitutes a conflictual context that is now largely undisputed. The WBGU report and the present assessment come to the conclusion, however, that climate change may in future become a key factor determining the eruption of violent conflict and crisis beyond locally and regionally limited, low-intensity conflicts, and may indeed ultimately change the international security architecture. The extraction from these discourses of the aspects salient to development cooperation is performed in the present report in a manner that always remains aware of the specific context, as not only does the relevance of these discourses vary greatly for specific sectors, regions and stakeholders, but they also have flowing transitions.



*2. Climate change, conflict and security: Key findings*



Global emissions of greenhouse gases (GHGs) have now reached a scale at which climatic changes are no longer avoidable and indeed are already occurring today – this is one of the key findings of the 2007 IPCC Fourth Assessment Report. The report assesses the impacts of climate change on the natural environment, as well as its social and economic impacts and the potential solutions available. The IPCC comes to the conclusion that, from a global perspective, the adverse effects of climate change on humanity will predominate in the long term. Over the last 100 years alone Earth has become 0.74°C warmer on average, while a further global 0.6°C increase in temperature compared with the pre-industrial age can no longer be averted, even if there were to be an immediate and complete halt to anthropogenic GHG emissions. Accordingly, global warming is already approaching the “dangerous” level of 2°C above the pre-industrial value (cf. Schellnhuber 2006). This will occur if the concentration of GHGs in the atmosphere reaches 450 to 550 parts per million (ppm). Given this situation there is a need not only for the international community to achieve a resolute reduction in GHG emissions but also to take steps at policy level towards developing and implementing adaptation measures. When assessing the 2007 IPCC reports, it should be borne in mind that they were unable to take account of the latest results from climate research. For example, Arctic sea ice is melting far more rapidly than had previously been assumed. At the same time, the feedback effects of melting sea ice on sea-level rise are still inadequately understood, so that the IPCC scenarios are based on conservative assumptions and may underestimate the actual scale of the threat (cf. Rahmstorf 2007).

The Stern Review (Stern 2006) commissioned by the British government also emphasises that far-reaching decisions on climate policy are urgently needed from an economic point of view given the impending (global) economic consequences of runaway climate change. The key message of Sir Nicholas Stern’s report is that climate change is the single greatest form of market failure known to humankind. Its impacts could cost 5–20% of global GDP each year. In public policy debate, that percentage has translated into a figure of EUR 5.5 trillion being put on the damages that might ensue. If, however, policies are implemented in good time, comparatively low costs of 1% of global GDP per year would arise.

Stern stresses that these figures serve essentially to illustrate the costs and benefits. However, they are sufficiently robust to seek to limit the concentration of GHGs to between 450–550 ppm, as a target for climate policy. Even to reach a point of stabilisation at 450 ppm is regarded by Stern as difficult and expensive. The next 10–15 years, he forecasts, will be crucial in terms of preventing the worst impacts of climate change and simultaneously planning and implementing adaptation measures. After that, the costs of doing both will rise sharply (cf. Stern 2006: 193, 425 et seq.). Like the IPCC, Stern underlines the fact that it is the poorest countries in particular that are most vulnerable in the face of climate change and that climate protection measures must therefore be integrated systematically into development policy. He declines to put a figure on the costs of adaptation for developing countries but projects that they will be higher, relatively speaking, than for

### Box 2.1: Highlights of the IPCC reports

The IPCC reports provide an evaluation of the current status of climate research. Alongside the environmental impacts of climate change, its impacts on key sectors such as water supply, agriculture, health and industry are analysed and the consequences for specific regions assessed. The potential for disasters and conflicts, both national and international, is at most touched on by way of examples. Thus, due to the wide-ranging nature of the IPCC evaluation, there is a need in many instances for additional work on specific socio-political issues. The key messages are:

- The scenarios up to 2100 (compared with 1980–99) show that temperatures will rise by 1.8°C (range: 1.1–2.9°C) in the best case and by 4.0°C (range: 2.4–6.4°C) in the worst.
- Sea levels may rise between 18–38cm and 26–59cm by 2100. The 20th century has already seen a rise of 17cm; since 1993 there has been an average rise of 3mm a year.
- Regional climate patterns are changing. Long term changes can be expected to occur in the Arctic (temperature and ice density), in the oceans (precipitation and salt content) and in relation to the winds.
- Extreme weather events such as droughts, heat waves and heavy precipitation have become more frequent, and the intensity of tropical storms has increased.

industrialised countries on account of their geographical location. He additionally mentions a range of potential arenas for action, such as regional awareness-raising about climate impacts, research on new plant varieties and slowing down deforestation, as inexpensive means of reducing emissions.

## Box 2.2: Highlights of the Stern Review

The Stern Review was commissioned by the British government in order to assess the economic costs of climate change. The aim of the report is to demonstrate the dimensions of the problem in such a way that the consequences of timely action and of inaction alike can be quantified. The results are correspondingly indicative but nonetheless plausible. While explicit references are made to climate protection measures and disaster management, there are only sporadic references to conflict (within and between countries) and to state capacity. The key messages are:

- In order to avoid serious impacts on the world economy, the concentration of GHGs in the atmosphere should be kept below 550 ppm. This would correspond to a 2–3°C rise in global temperatures.
- Gross Domestic Product (GDP) will increase by a factor of 3–4 by 2050. This means that emissions per unit of GDP would have to be cut by ¾ by 2050. The costs of this course of action would be roughly 1% of today's global GDP.
- If no action is taken, there is a risk that global temperatures will rise by 2°C as early as 2035; by 2100 this will entail costs amounting to 5–19% or, in the worst case, up to 20% of global GDP.
- The damages will be unevenly distributed: the poorest countries will be affected the soonest and the most severely.
- Necessary measures include setting a global price for carbon dioxide, massive support for technological breakthroughs, conservation of forests as an inexpensive form of climate protection, and improvements in energy efficiency, especially in power stations and transport.

## 2.1 Causal linkages between climate impacts and conflict

Both, the IPCC and the Stern Review show that climate change functions as an additional stress factor on societies that are generally already facing the manifold challenges of global change (IPCC 2007b: 361). Developing countries are especially affected whose geographical situation, dependency on agriculture and lack of financial or institutional resources and capacities make it considerably more difficult to cushion the

negative impacts of climate change (Stern 2006: 29). Thus, in the first instance climate change poses a threat to human security, particularly in societies that are already marginalised, and simultaneously undermines key development objectives (such as those formulated in the Millennium Development Goals (MDG)).

### Box 2.3: Security, governance and the debate about climate-induced conflicts

In the debate about the role of climate change in matters of security and governance, terms and concepts are frequently used in a non-standard way. This is due to the variety of stakeholders involved and their varying perspectives. Development organisations, insurance companies, intelligence agencies and defence ministries all use markedly different concepts of security. In principle, three fundamental levels of security can be identified:

- **(1) Individual or human security:** This level is about the satisfaction of individuals' basic needs in the form of food, water and shelter. Security in this sense can be formulated as freedom from want. Individual, human security and "livelihood security" can broadly be used as synonyms.
- **(2) Internal security:** The second level, in the context of climate change, is about the extent to which the impacts of climate change influence (violent) intra-state conflicts between different population groups or between the state in question and a group or groups in society.
- **(3) International security:** The third level relates to the potential for conflict between states (i.e. "inter-state" conflicts) and issues of international security that are influenced substantially by climate change. This includes potential conflicts of interest over the use of water as well as regional destabilising events that may come about as a result of the collapse of states or violent conflicts within states.

There is no hard and fast division between these different levels: increased individual insecurity can contribute to the forming of groups prepared to use violence, and this in turn may have an effect on the internal security of a country. Should violent unrest ensue, there is a risk that the third level will also be affected by regional destabilisation, with corresponding impacts on individual security in neighbouring countries. Thus "security policy" is a multi-dimensional concept: it ranges from public security (e.g. protection from disasters) on the one hand through to classical military-based national security on the other.

**Governance** plays a crucial role in creating security. Governance is the capacity of a state and/or society to manage its affairs and to fulfil elementary state functions such as welfare, the rule of law and maintaining the monopoly on violence in both internal and external relations. Governance capacities also have an influence on how climate-induced problems are dealt with and on the scope for achieving peaceful conflict transformation. Three (idealised) types can be identified (WBGU 2007: 42 et seq.; Schneckener 2004):

- **(1) Consolidated states** that demonstrate a robust capacity to manage societal affairs and perform elementary state functions.
- **(2) Weak states** that have a certain degree of capacity to manage state affairs but display weaknesses in the performance of state functions.
- **(3) Fragile states** that are barely capable of performing key state functions and display only very limited governance capacity. The extreme case of the fragile state is the collapsed or failed state, one that has come to represent only a geographical entity.



The more limited the governance capacity of a state is, the more limited is its ability to guarantee security on the three levels outlined above. As state capacity further weakens, there is an increased probability that destabilisation phenomena will increase nationally and regionally. Such a weakening may occur as a result of climate change (cf. 3.5). Climate-induced conflicts thus arise indirectly when the capacity of states to deal with existing and potential conflicts is weakened. Since this affects those states that are already fragile first and foremost, the focus will be on these in the following.

In addition to issues concerning the level of security and statehood, there is a further dimension that is often bracketed out in the debate, namely, is a society currently in a **conflict or post-conflict situation**? Depending on the situation a state is in to begin with, its capacity may be additionally limited. With an existing history of conflict as well as an atmosphere of mistrust towards state institutions, social actors further may see violence as a more expedient strategy than peaceful conflict transformation. It should be remembered at this point that fragile states are not automatically states in post-conflict or crisis situations, even if the latter may be more vulnerable to escalating conflict (BMZ 2007: 9 et seq.).

Neither the IPCC reports nor Stern's estimate of the economic impacts focus on the linkages between climate change and potential social tension and conflict.<sup>3</sup> They do make the connection at various points, though, between biogeophysical factors and existing or potential new conflicts and disasters – for example in Africa, the Nile Basin and Central Asia (e.g. IPCC 2007b: 442; Stern 2006: 137). However, these reports do not provide a systematic perspective at regional or global level.

The WBGU report seeks to close these gaps by linking biogeophysical forecasting with social scientific research on state stability and capacity.<sup>4</sup> An analysis of more than 70 “environmental conflicts” (cf. Carius et al. 2006) shows that environmental factors to date have rarely led directly to violent conflicts or problems of international security. Rather, socio-economic conditions are often affected adversely by increased environmental stress to such an extent that existing coping capacities are overstretched (cf. WBGU 2007: 41 et seq.). Alt-

hough these environmental conflicts already have cross-border spillover effects in some instances, in WBGU's view they are generally diffuse and to be regarded as low-level (WBGU 2007: 40). On account of this limitation, they often have the quality of intra-state conflicts and crises that only become relevant to security policy through their follow-on impacts. Such follow-on impacts include migratory movements, the establishment of war economies and transnational criminal networks as well as regional destabilisation with potentially global consequences due to the interruption of economic cycles.

The “new” climate-induced conflicts expected by WBGU threaten further to exacerbate existing factors in environmental conflict and potentially to generate new ones. The risk that these initially intra-state conflicts will be globalised, and their significance for national (i.e. American) and international security, provide the starting point for the CNA analysis.

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3 The link between climate change and conflict has been the subject of various analyses for some years now, however. Cf. e.g. BMU 2002, Carius/Tänzler 2005.

4 The outcomes of this linkage take the form of future prognoses and are characterised by a large number of uncertainties. Most of the studies available are as yet unable adequately to incorporate the impact of feedback effects into their models. Since the actual lines of development are frequently unclear, there is a danger of “overshoot” (Stern 2006: 156), meaning that despite wide-ranging measures, global warming cannot be slowed down to any great extent. The following comments seek to guarantee a solid basis for the concluding recommendations by focusing on robust trends.

### Box 2.4: Highlights of the WBGU report

The WBGU report attempts to develop plausible narrative scenarios about the relevance of climate change for conflict on the basis of current research in environment and security and widely accepted biogeophysical trends. Despite examining the issue systematically, various plausible conflict constellations remain sketchy. Neither the conflict over the Arctic nor the especially tension-filled constellation in the Middle East is examined in any detail. Due to the global reach of the report, recommendations often remain more abstract than the findings from the individual scenarios. The key messages are:

- Without resolute action to prevent it, climate change will overstretch the adaptive capacities of many societies over the coming decades.
- Climate change intensifies existing environmental crises such as droughts, water scarcity and soil degradation; it increases land use conflicts and triggers environmental migration.
- The resulting violence and destabilisation threaten national and international security to an unprecedented degree.
- Climate change is taking place during a phase of global transition towards a multipolar world order. Depending on how climate change is handled, this transition may either take a peaceful course or be a source of conflict.
- Prevention is possible above all by avoiding climate change and adapting to it.

### Box 2.5: Highlights of the CNA analysis

The CNA analysis is based on the experience of an advisory council consisting of eleven former admirals and generals of the US Armed Forces. It is regarded as a fact that climate change is a potential (co-)driver of destabilisation and conflicts. The comparatively short study remains largely illustrative and concentrates on military and security policy issues. The key messages are:

- Climate change presents a serious threat to the national security of the USA.
- Climate change is becoming a “threat multiplier for instability” in the most vulnerable regions of the world and may also give rise to tensions in stable regions.
- Climate change, national security and energy dependence are interlinked.
- It is the job of the US Department of Defense to assess the extent to which the military infrastructure of the USA is affected by the impacts of climate change.
- The US government should play a constructive role in international efforts at climate protection and make progress towards establishing a global partnership for capacity building in underdeveloped countries.

In its report, CNA does not explicitly rule out the use of military force as a response to the consequences of climate change<sup>5</sup> and views climate change as a threat that could prolong the “war on terror” (CNA 2007: 17). While CNA focuses in particular on regional problems and linkages, WBGU, on the basis of findings

from environment and security research, systematically elaborates four key conflict constellations that are conditioned by the anticipated impacts of climate change and may culminate in the outbreak of violence (see Box 2.6).

### Box 2.6: WBGU conflict constellations<sup>6</sup>

**1) Climate-induced degradation of freshwater resources:** Causal chain I ranges from water crises to violent conflict. Climate change gives rise to a reduction in the regional availability of water, leading to a water crisis; the ensuing destabilisation leads to conflicts involving the use of violence. However, WBGU views the likelihood of interstate water wars as not very substantial.

**2) Climate-induced decline in food production:** Causal chain II ranges from food crises to violent conflict. Climate change gives rise to a massive decline in agricultural production; food crises ensue, which may spill over into violent conflict through societal destabilisation.

**3) Climate-induced increase in storm and flood disasters:** Causal chain III argues that storm disasters can ultimately be a trigger for violent conflict. The intensity and duration of storm and flood disasters increases on account of climate change. As a consequence there is a collapse of public order and/or an intensification of intra-state conflicts, which may lead to growing violence. WBGU also points, however, to a possible contrary effect triggered by emergency aid transcending the boundaries of a conflict.

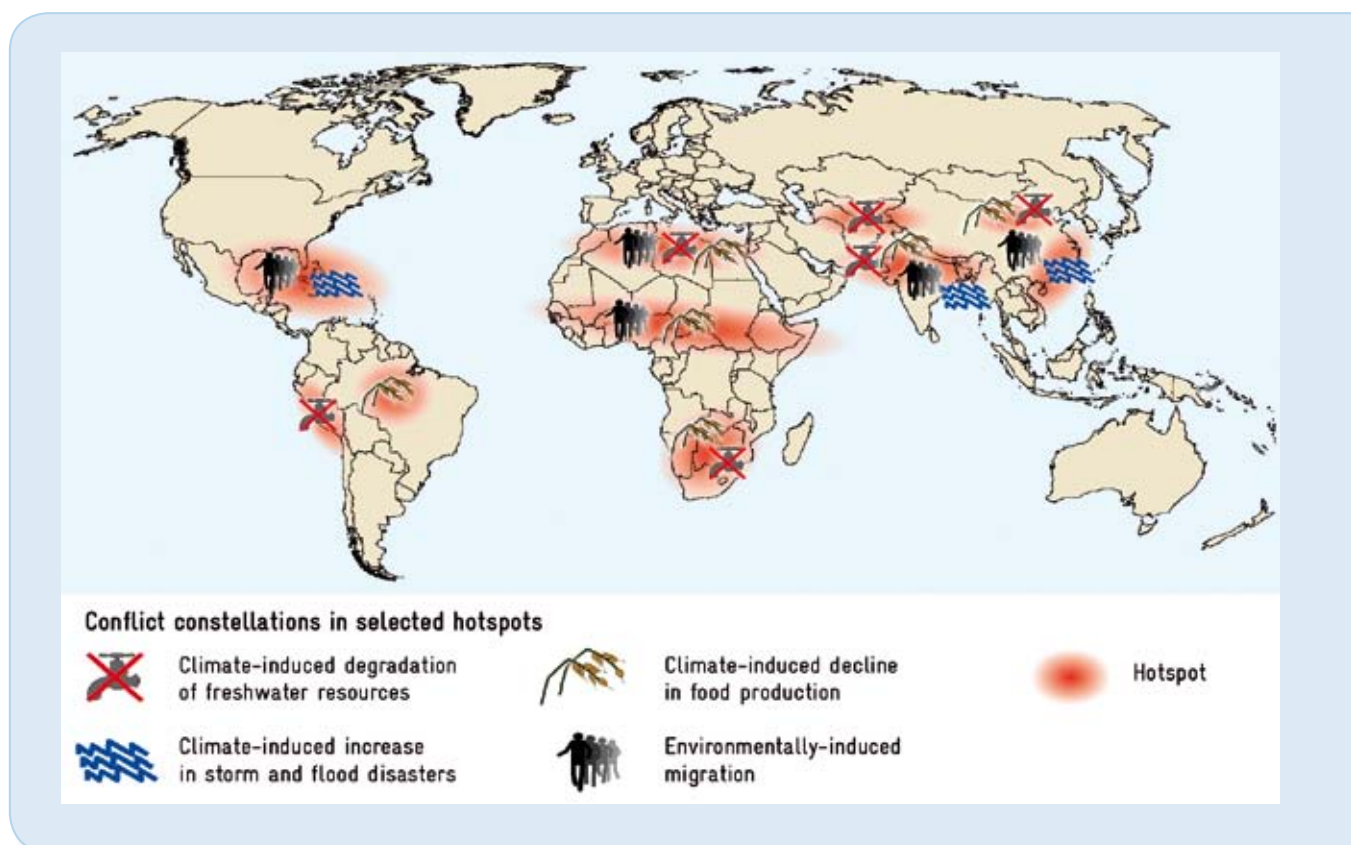
**4) Notable rise in environmentally-induced migration:** Causal chain IV assumes that migration is a trigger for violent conflicts. Climate change intensifies both the gradual degradation of water and land and the impacts of disasters. The decision to migrate may lead to destabilisation and violent conflict in the regions of origin, transit or destination.

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5 For example, CNA assumes that a far-reaching epidemic could bring with it a “full-scale stability operation” (CNA 2007: 16), without specifying the latter. Since the US Army counts peacekeeping, peace enforcement, combating terrorism and battle operations among its “stability operations” (US Army 2003: 1-4), this conclusion cannot be ruled out.

6 Cf. figures in the Appendix for a detailed representation of conflict constellations.

Figure 2.1: Future climate change hotspots according to WBGU



## 2.2 Negative convergence with other global trends

The significance of impending climate change in terms of security policy and its conflict relevance only fully comes to light through the interplay between the environmental developments described above and other global trends. In particular, population growth, urbanisation and global economic development will occur alongside climate change and may in some cases have a markedly intensifying impact on existing and future conflict constellations.

By 2050, possibly even sooner, population growth will lead to a world population between 8.7 and 9.3 billion people. A further increase may occur by 2100 (United Nations (UN) 2004). In regional terms this will be reflected particularly in the population dynamics in Africa, which is set to grow from 900 million (2005) to nearly 2 billion (2050), and in Asia, where the population will grow from 3.9 to 5.2 billion (United Nations Population Division (UNPD) 2006). Thus, population growth is taking place in precisely those regions that (1) will be most affected by climate change and (2) are most likely to have serious difficulties dealing with its impacts.

Economic development is advancing worldwide and is manifested, among other things, in a long term rise in consumption of energy and resources: it is expected that by 2030 primary energy needs will increase by more than 50%. Two thirds of this growing demand will come from today's developing and newly industrialising countries (International Energy Agency (IEA) 2005: 79). This trend may be accelerated even further by the rising standard of living in a range of newly industrialised countries, especially India and China (cf. WBGU 2007: 49 et seq.). One consequence of this is growing competition over resource use and an increase in resource shortages. Another is a rise in world energy prices, which will plunge net energy importing countries further into debt and weaken them both economically and with regard to their capacity for action.

Urbanisation is also advancing. By 2030 up to 60% of the world's population could be living in cities. The largest growth in city populations – nearly 50% – will be in Africa and Asia (UNPD 2006). As a rule, urbanisation does not occur in a planned fashion or with a view to the future but rather in

an uncontrolled manner, thus contributing to the emergence and expansion of slum areas. In 2005, for example, 72% of the urban population of Sub-Saharan Africa and 56% in South Asia lived in slums (UN Population Fund (UNFPA) 2007: 16). According to prognoses produced by UN Habitat, every third city dweller will be forced to live in slums in the year 2030; this means up to 2 billion people without an adequate basic infrastructure (UN Habitat 2003: 1, 24). A significant proportion of these urbanisation processes is leading to the creation of megacities, and especially to the emergence of cities with between 1 and 5 million inhabitants or less than 500,000 inhabitants.

### 2.3 'New' quality of climate-induced conflicts

Climatic changes per se are a phenomenon humanity has lived with for a long time. Over the past centuries there have been various instances in which they have exerted a highly negative influence on societies, in some cases triggering crises or exacerbating conflicts and, in combination with other factors, leading to the collapse of entire societies (cf. Diamond 2005). What is new, however, is that (global) climatic changes are now being caused by human activity and are co-occurring with a range of other new developments (cf. Box 2.7). In addition, they now no longer occur over a period of several centuries or millennia but within a single century – faster than most ecosystems are able to adapt. For this reason, the current situation can be described as qualitatively new in contrast to earlier influences exerted by climatic changes (WBGU 2007: 169 et seq.). At the same time it should be remembered that the potential developments outlined in this report, especially regarding biogeophysical trends over the next 10 to 15 years, can be contained significantly by proactive climate policy, even if this hardly appears plausible in view of the progress made in international climate policy over the last 15 years.

On the basis of experiences from past environmental conflicts in particular, three major conclusions emerge from the four WBGU conflict constellations:

1) Up to now, increased environmental stress has led to crises or violent conflict principally in combination with other factors, such as a rising demand for resources, a lack of governance capacity, a history of conflict or social disparities (Carius et al. 2006).

2) The WBGU assessments in particular suggest that **climate-induced environmental stress is increasing to a considerable extent and that the different constellations mutually reinforce one another**. Thus, for example, water scarcity exacerbates food scarcity and simultaneously increases the pressure to migrate. Whereas the first three of WBGU's causal linkages between climate and conflict can be traced to major environmental "drivers of conflict", **migration, as a potential driver of conflict, is a secondary type of conflict, or a "translation mechanism"** (WBGU 2007: 117): the massive impacts of climate change on the availability of water and on food production as well as the impacts of extreme weather events will result in far-reaching migration flows, so it is assumed. This conflict-induced causal linkage is one of the conflict scenarios frequently mentioned in connection with climate change, although it remains contested, e.g. with regard to circulating figures of about 150 million refugees by the year 2050 (WBGU 2007: 117).

3) The interplay between these four drivers of conflict increases the likelihood that problems which could so far be dealt with in a national context and were located mainly in the sphere of "human security" take on a new quality. **These problems may lead to the further destabilisation of already fragile states and may, in extreme cases, become regionalised or internationalised**. The basic assumption here is that governments will no longer be in a position to carry out key state functions, in the form of public services, and will forfeit legitimacy and authority (Schneckener 2004). In extreme cases, they will become permanently vulnerable to extremism, terrorism and rebellion (CNA 2007: 16; cf. WBGU 2007: 42 et seq.); at the least, however, there will be a further intensification of the "push" factors of migration.

As a result, there is a threat of the **exportation of state fragility**, which may even affect supposedly stable states. WBGU therefore warns of any increase in failing and fragile statehood that could spread across entire subregions (WBGU 2007: 170). Classical military-based security policy is structurally incapable of dealing with these climate-induced conflicts, due to both its unsuited methods and the large number of crises to tackle. However, a range of challenges also presents itself to environmental and development cooperation (cf. Box 2.8).

### Box 2.7: Migration

Resource scarcity has always prompted people to move either temporarily or permanently to other locations. As a result of climate change fewer potential geographical areas are available for such migration driven by population growth and urbanisation. In Iran, west India and Pakistan, and in the north and west of China numerous villages have become depopulated due to a lack of water resources (Brown 2005). Migration and its impacts also affects international relations. Empirical evidence shows for example, that international movements of refugees have led to conflicts in the regions of destination, above all when tensions already exist in these regions, or when competition for resources becomes more intense between local populations and refugee groups (Salehya/Gleditsch 2004; Martin 2005). Secondary conflicts need not necessarily occur, however. This depends essentially on the conditions already prevailing in the regions of destination, for which WBGU identifies the following determinants: competition over resources/demography; diaspora and migration networks; ethnicity; governance capacities; response of the country of destination and political stability/history of conflict (WBGU 2007: 119).

### Box 2.8: New qualities of conflicts under climate change

(1) **Simultaneity:** The number, intensity and dimension of potential conflicts and hotspots will exceed that which can be dealt with by military means. This is due to the simultaneity of climate change, whose impacts occur everywhere at the same time (WBGU 2007: 165 et seq.).

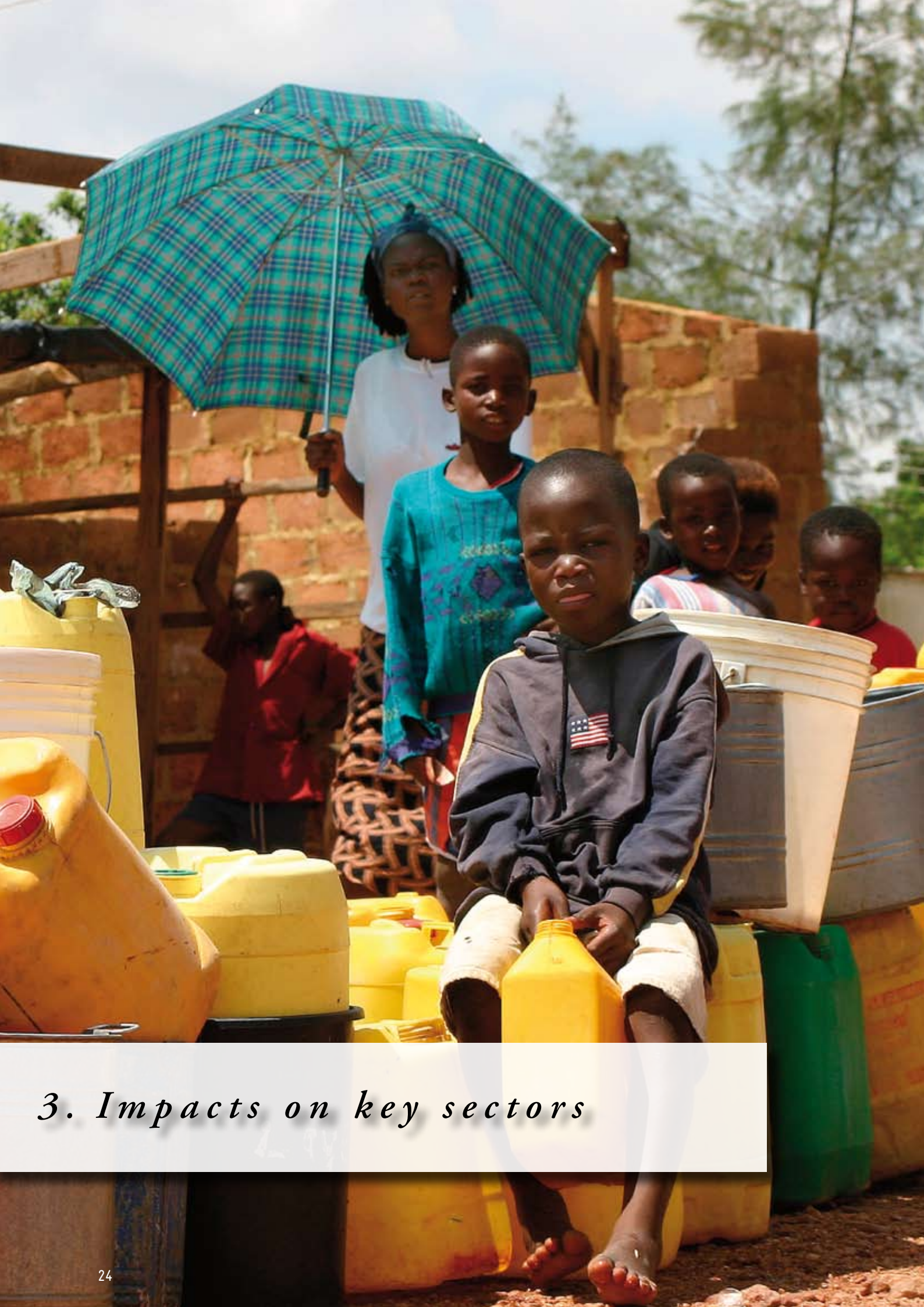
(2) **Feedback effects:** "Wild cards" – unpredicted feedback effects – can speed up climate change and bring about "new" effects at regional level (e.g. the release of methane gas during the thawing of permafrost soil in the Arctic). This means that previous knowledge can be drawn on only to a certain extent in forecasting.

(3) **Amplification:** The combination of different climate change impacts leads to forms of amplification that are hard to forecast. Thus, the adverse effects of a drought followed by a heavy rainfall event may accumulate for agricultural production and lead to not only a decline but a complete loss of harvests (Stern 2006: 59).

(4) **Global lines of conflict:** The major new quality of "climate change as security risk" identified by WBGU is the confrontation between the principal generators of climate change and those principally affected by it. However, this conflict in itself is hardly relevant from a security policy point of view. Rather, it should be channelled into a global compensation regime.<sup>7</sup> This particularly concerns small island states, whose territorial integrity will be threatened by rising sea levels. The first bilateral agreements between the Pacific islands and New Zealand are already being negotiated with regard to the intake of the population affected, in the eventuality that the islands actually become submerged (cf. Romer 2006).

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<sup>7</sup> Furthermore, it is questionable whether the dichotomy itself can be maintained. One principal generator of climate change, the USA, is severely affected on its coasts, just like China, which has become one of the principal generators.



*3. Impacts on key sectors*

The causal linkages identified by WBGU between climate and conflict represent plausible conflict constellations that may arise as a result of climate change. Whether they will become reality in the near future – and if so, to what extent – cannot be determined precisely on the basis of current knowledge. Regardless of this, however, climatic changes themselves will place new demands on the main areas of activity of technical development cooperation. This applies both directly to the major environmental drivers of conflict as well as indirectly to the resulting migration.

Rural development and urbanisation are two areas that are set to face markedly differing challenges due to the specific structural conditions, vulnerabilities and coping capacities affecting each in relation to the impacts of climate change. Common to both, however, are the challenges that will potentially arise for key infrastructures such as energy supply and transport (in addition to water and food). Considerable demands will also be placed on the governance structures of a country. Climate change places burdens on the functional capacity of societal steering functions, e.g. in the areas of health care, environmental policy and resource management. While extreme weather events are no new phenomenon in this regard, the extent and frequency with which they occur and the negative impacts they have will nonetheless increase as a result of climate change. Any response to the question of how this trend can be countered has therefore to be a multi-sectoral one.

In the following, the major relevant climate change trends will be presented in relation to the different areas in the form of generalised statements. In Chapter 4, specific trends will then be elaborated in more detail in terms of their regional significance and discussed in relation to existing deficiencies in state governance. The aim here is to re-emphasise the importance of governance, regardless of individual sectoral trends: policy formulation and implementation capacity as a crucial cross-

cutting competency for dealing with the challenges posed by climate change. **However, governance can not be conceived of as a purely technical problem.** Also of crucial importance is its political foundation, the development orientation of the state in question. Whether the challenges of climate change will be met is not only a question of analysing and understanding, but also of actively tackling them. In the past, for example, states or state institutions have frequently played an active part in the non-sustainable use of resources, even to the extent of encouraging it. In some instances, this has led to violent conflict, as in the case of illegal logging in Indonesia (see Schroeder-Wildberg/Carius 2004). Thus a focus on “technical fixes” would not only be inappropriate but could also have disastrous consequences if it meant stabilising or even reinforcing a form of governance that is illegitimate and promotes social exclusion.

Whether individual states or influential social groups can muster the will to **address the challenges posed by climate change in a development-oriented<sup>8</sup> manner** remains to be seen in each instance. In what follows, the main focus is on the environmental consequences of climate change.

### 3.1 Water

The impacts of climate change on global water supplies will be substantial. The water sector will be subject to wide-ranging demands due to the interplay of various influencing factors, such as changes in precipitation patterns, rising sea-levels, and the increase in extreme weather events as well as their intensification. An added concern is that this sector is already showing signs of impending crisis even today: 1.1 billion people are still without access to clean water, while at the same time a further increase in global demand is to be expected.

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8 *BMZ has set five criteria for assessing development-oriented policy. These are (1) “pro-poor” and sustainable policy design; (2) respect, protection and guarantee of human rights; (3) democracy and rule of law; (4) transparent and effective policies; (5) and cooperative behaviour in the international community (BMZ 2007: 15).*



## Main trends:

- (1) According to the IPCC, the **availability of water** will decrease in absolute terms as a result of global warming. By mid-century some regions, including the MENA region and southern Africa will see a decline of between 10% and 30% (IPCC 2007b: 5; IPCC 2007b: 183). It remains unclear how great the resulting water stress towards the end of the century will be. Figures for the proportion of the world's population that will suffer as a result of water stress range from 262 million to approximately three billion by 2080 (IPCC 2007b: 194). Other estimates predict that by the year 2050 two billion people (in the best case scenario) and seven billion people (in the worst case) will experience water scarcity (UNESCO-WWAP 2003).
- (2) **Patterns of precipitation** will be subject to pronounced regional fluctuations. Whereas an increase in precipitation is expected in the higher latitudes, it is assumed that there will be a decline in the subtropics (IPCC 2007b: 180; WBGU 2007: 57). The force of individual precipitation events will increase markedly even in regions where the total amount per year is set to decrease (IPCC 2007b: 180; WBGU 2007: 57-59). The danger of flash flooding will increase accordingly (IPCC 2007b: 185). The differences between the rainy season and the dry season will become much stronger (IPCC 2007b: 176). As a result, heavier precipitation will not appreciably halt the absolute decline in water availability, as it will largely occur during the rainy season – while drought events will take on even more extreme proportions.
- (3) Due to the temporary rise in precipitation levels and the predicted **glacier melt**, water runoff from rivers may increase by 10% – 40% in some regions by mid-century. This applies to the Andes and the Himalayas, for example (IPCC 2007b: 5; WBGU 2007: 80 et seqq.). The main period of meltwater runoff will probably occur during late winter (IPCC 2007b: 176). Soil erosion will also increase with snow falling increasingly as rain (IPCC 2007b: 190). One important issue with regard to future water availability will be to what extent suitable storage facilities and other supply infrastructures (pipelines, pumping systems) can be developed to use water efficiently (Stern 2006: 63). Alongside altered water cycles, population growth and economic growth remain crucial determinants of water availability (IPCC 2007b: 182).
- (4) **Extreme weather events** will not only cause considerable economic damage (WBGU 2007: 69), they may also have a negative impact on water quality and contribute to the spread of epidemics (IPCC 2007b: 179). This could reach a level at which local water supplies will no longer be suitable for use as drinking water without technical and financial input (IPCC 2007b: 187). Additionally, **sea-level rise** will lead to groundwater and river water salinity in coastal regions. Rising sea levels will also cause increasingly redirect back to shore the wastewater previously piped into the sea, thus intensifying groundwater and river water pollution (IPCC 2007b: 189; CNA 2007: 16).

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9 *BMZ has set five criteria for assessing development-oriented policy. These are (1) “pro-poor” and sustainable policy design; (2) respect, protection and guarantee of human rights; (3) democracy and law and order; (4) transparent and effective policies; (5) and cooperative behaviour in the international community (BMZ 2007: 15).*

### Relevance for security policy:

- Diminishing availability of water increases competition over water use between the core sectors of economic and social development (e.g. irrigation agriculture, energy generation).
- As established hydrological patterns break down, the risk of disasters whose occurrence may lead to a breakdown of public security increases.
- New water infrastructures require investment. Refinancing by passing on higher water prices to the general public may, however, result in violent conflict, as was the case in Cochabamba (Bolivia) in the year 2000.

## 3.2 Food and rural development

Forecasts regarding food security are closely connected to the issue of water availability (cf. Houdret/Tänzler 2006). The key sectors of agriculture and fisheries will be especially severely affected by the impacts of climate change (IPCC 2007b: Chapter 5; Stern 2006). An increase in extreme weather events such as droughts, heavy rainfall, flooding and storms may destroy entire harvests and trigger famines. There is a danger that falling yields and rising prices may lead to a loss of food security.

### Main trends:

- (1) **Food availability will decrease.** If global warming rises to 3°C it is likely that the number of people suffering from hunger will increase by 250 million to 550 million (Stern 2006: 72). According to the IPCC assessment, a slight increase in temperature may initially bring about larger yields worldwide and thus trigger a drop in food prices. However, there is no indication that the impacts of growing competition over use with energy crops, for example, has been taken into account in this forecast. Over the course of the coming decades, there will be a substantial decline in food production. Prices will rise as a consequence of this (IPCC 2007b: 276, 300; WBGU 2007: 94). In the long term, there may be an increase in land use competition between food and energy crops (IPCC 2007b: 278, 281).
- (2) The combination of various climate change impacts (global warming, diminishing availability of water, heat waves, and so on) **will overstretch adaptive capacities in agricultural production** (IPCC 2007b: 278; WBGU 2007: 95). This is the case especially for developing countries heavily dependent on agriculture. Soil erosion will occur more rapidly as a result of extreme weather events, while global warming will further intensify processes of desertification. A combination of both will lead to a decrease in available farmland and a reduction in potential yields (IPCC 2007b: 284). Finally, food production in river deltas may be substantially constrained due to sea-level rise and coastal erosion, since groundwater salinity increases when storm floods penetrate further inland (IPCC 2007b: 328).
- (3) **Declining fish stocks** caused by ocean acidification. The greater uptake of CO<sub>2</sub> will have a negative impact on the supply of fish (and thus of proteins) (Stern 2006: 56). This is considered to be sure knowledge, despite residual uncertainties regarding the exact impacts of global warming on the oceans. This trend is further reinforced by overfishing around the world and in view of predicted population growth. The consequences for the nutritional situation of large sections of the world's population are considerable: currently 2.6 billion people satisfy 20% of their protein needs by consuming fish (IPCC 2007b: 276).

- 4) **Demand for food will increase.** According to the IPCC an increase of about 55% can be expected by 2030 and of 80% by 2050. Alongside population growth, this is explained by reference to changes in living standards. In order to satisfy this increase in demand, it will be necessary to extend areas of land for crop growing: the IPCC predicts an increase of approximately 30% (60 million ha) for irrigation agriculture and 19% (185 million ha) for rainfed agriculture. This expansion is expected to occur above all in Latin America and Africa, although it should be borne in mind that climate stress is expected to increase considerably in these regions as well (IPCC 2007b: 280 et seq.). According to WBGU agricultural production from rainfed agriculture could fall by about 50% in some regions by 2020 (WBGU 2007: 70), meaning that local demand may no longer be able to be satisfied.
- (5) **Conditions for rural development will deteriorate.** 22% of jobs around the world are in agriculture. Three quarters of the 1.2 billion people who have to survive on less than US\$1 a day live and work in rural areas (Stern 2006: 67). Due to their condition of relative poverty, this significant group of people are those most affected by climate change and may be expected to have considerable difficulty adapting to the changes predicted (IPCC 2007b: 281 et seq.). Even today the annual loss of income caused by desertification and soil salinity around the world is estimated at roughly US\$50 billion (WRI Database 2006, quoted in Houdret/Tänzler 2006: 364). Deteriorating living and working conditions in rural areas may lead to more outward migration. Forecasts with regard to urbanisation point in the same direction.
- (6) Climate change also gives rise to **growing demands on sustainable resource management.** Much as in agriculture, the productivity of forests will increase in the short term but drop over the long term (IPCC 2007b: 280). The growing frequency of forest fires triggered by heat waves fosters desertification and soil erosion (cf. Stern 2006: 71; IPCC 2007b: 290). The Millennium Ecosystem Assessment (MEA) has already pointed to the dwindling potential of ecosystem services under conditions of global change (WBGU 2007: 5 et seq.; MEA 2005). This process is driven forward by other problems as well, such as illegal logging. At the same time, climate policies such as the tax-free expansion of bioenergies may lead to non-sustainable developments, as the forced expansion of palm oil production in Malaysia and Indonesia shows (UN Energy 2007).

### Relevance for security policy:

- The crisis of the rural areas is intensifying and food security can no longer be guaranteed in some cases. The legitimacy of governments is increasingly called into question because of this.
- The loss of migratory destinations may lead to increased competition over fertile land and to violent conflict.
- The growing crisis in agriculture is triggering uncontrolled migration to the cities, which in turn may become social hotspots.
- Potential solutions such as a greater expansion of bioenergy may not only intensify the crisis in food production but may also lead to land use conflicts.

### 3.3 Infrastructure, energy and transport

In view of the predicted climate trends and their associated socio-economic processes, key infrastructures are facing new demands. This applies above all to water supply and wastewater disposal, energy supply and transport and communications systems (IPCC 2007b: 362ff; WBGU 2007: 172). Both existing infrastructures and those to be planned need to be adapted to the risks arising from extreme weather events (storms, floods, earthquakes and forest fires), especially in coastal regions. Conflict relevance arises when the collapse of key infrastructures – in states that are fragile to begin with or in regions where tensions are rife – leads to a loss of state governance capacity.

#### Main trends:

- (1) **Extreme weather events will intensify.** IPCC points to the very high probability that extreme events will become more intense (IPCC 2007b: 359). Most affected are infrastructures (industry, settlements) in high risk regions, that is, near coasts and rivers. However, climate-sensitive sectors such as agriculture are also especially vulnerable. To the extent that industry is affected, large economies are threatened with losses amounting to several percentage points of GDP, while in smaller regions reductions of up to 25% may even occur (IPCC 2007b: 359). Extreme precipitation may trigger mudslides, flood roads, bring down electricity lines and ultimately make humanitarian aid and reconstruction more difficult (IPCC 2007b: 362, 365; Stern 2006: 78 et seq.; WBGU 2007: 116, 124). Natural hazards such as Hurricanes Mitch, George and Katrina have already demonstrated the destructive power of storms. In addition to extreme events, gradual but extreme changes in regional climatic conditions, such as the thawing of permafrost soils, may cause considerable damage to roads and railway tracks. In some regions of India today, for example, 14% of annual maintenance costs for a newly built section of railway line is invested to remedy of weather-induced damage (IPCC 2007b: 371).
- (2) **Drought events as a threat to electricity supplies.** Countries that produce electricity largely using hydroelectric power will be particularly severely affected by reduced precipitation (Stern 2006: 62 et seq.; WBGU 2007: 133). There have already been sizeable losses of production in this sphere in the past, which have brought with them significant economic losses. In Brazil, for example, a drought combined with increased energy requirements led to a collapse of electricity supply in 2001. The ensuing economic losses were considerable – a drop of 1.5% of GDP (IPCC 2007b: 586). In 2002 Brazil's electricity supply was 90% dependent on hydropower, while this figure is between 80% and 100% for Tanzania, Namibia, Cameroon, Mozambique, Ethiopia, Zambia, Uganda and the Democratic Republic of the Congo (DRC) (WWF et al. 2006: 4).
- (3) **Coasts as high risk regions.** Coastal zone management and the protection of coastal cities in many regions of the world are facing particular demands in view of rising sea levels (IPCC 2007a: 812; WBGU 2007: 162). It is not only infrastructures themselves that are especially at risk here but also the increasing number of megacities and rapidly growing medium-sized cities (see also 3.4) (IPCC 2007b: 372 et seq.). Large river deltas in Asia are especially prone to extreme risks (cf. IPCC 2007b: 858 et seq.). 300 million people living in 40 deltas around the world – often in urban centres – are at risk from flooding and loss of land. It is estimated that by 2050 one million people living in the three most vulnerable deltas – the Nile, the Ganges-Brahmaputra and the Mekong – will be directly affected. Estimates for the Yangtze river delta in eastern China and the Godavari Delta on the east Indian coast range between 50,000 and one million affected people (IPCC 2007b: 327). Megacities in coastal regions are also heavily affected by subsidence (WBGU 2007: 104). Sea-level rise as well as extreme precipitation may cause wastewater systems in coastal regions to overflow (IPCC 2007b: 189). Serious health risks may ensue, and water supplies may be substantially impaired (IPCC 2007b: 189).
- (4) **New structures, rising emissions.** Due to the scarcities of food, water and energy that are expected to occur as a result of climate change in the medium term, it may be necessary to build up new distribution structures (e.g. transport and supply infrastructures). More goods will need to be transported over longer distances, requiring more fuel and an improved transport infrastructure (IPCC 2007b 199). This is not only costly but may generate additional GHG emissions and thus exacerbate the problem. Moreover, infrastructure measures

and investments are generally planned for the long term – over several decades – so that the potential impacts of climatic changes need to be anticipated (IPCC 2007b: 374). Coastal protection measures are also expensive – for example, the cost of building dykes across 8,000 km in Bangladesh as a protection against sea-level rise is estimated at approx. US\$10 billion (Stern 2006: 112).

### Relevance for security policy:

- The impacts of climate change may damage key infrastructures, such as energy supply, and consequently destabilise public order.
- Wide-ranging destruction of the coastal infrastructure may lead to mass migration movements and trigger tensions in regions of destination.
- The decline in hydroelectric power generation may additionally reinforce competition/conflicts over fossil energy sources.
- New supply channels may additionally increase GHG emissions and thus exacerbate problems – including the drivers of conflict.

## 3.4 Urbanisation

Climate change is set to have diverse impacts on the development of cities, which will occur in parallel to processes of urbanisation. Half of today's world population already lives in cities. The manner in which these processes of urbanisation are taking place in large parts of the world is already posing a serious challenge to the capacities of urban centres to absorb the extra influx. 72% of the urban population in sub-Saharan Africa and 56% in South Asia live in slums (UNFPA 2007: 16). Climate change-induced scarcity combined with the damage expected to occur on coasts, especially due to floods, storms and sea-level rise, may lead to considerable social tensions whose conflict potential has hardly been systematically examined to date.

### Main trends:

- (1) **Rising temperatures in growing cities.** Cities will increasingly suffer from heat waves and poor air quality (Stern 2006: 74). An increase in temperature will also encourage the spread of pathogens. This effect is further intensified when water quality diminishes (see above) and urbanisation occurs in a random manner, so that the influx is in no way matched by a corresponding infrastructure. According to IPCC, slums in particular are climate-sensitive city regions, i.e. they are highly vulnerable to climatic variability – this is proven by the impacts of Hurricane Katrina (IPCC 2007b: 374). In view of the fact that the proportion of the world's population living in cities

could rise to as much as 60% by 2030,<sup>10</sup> serious health problems can be expected. This trend, along with the ones outlined below, is intensified by the fact that the growth of cities occurs predominantly in an uncontrolled manner. This results in additional challenges relating to states' steering capacity and their ability to maintain law and order (cf. Barqueiro 2006; Wulf 2006).

(2) **Inhabitants of coastal cities are at greater risk.** More than two thirds of major cities around the world are located in near-coastal regions and hold considerable risks in relation to sea-level rise and flooding (IPCC 2007b: 317). All in all, 634 million people live in these threatened regions, which lie up to ten metres above sea level. In a majority of the countries affected, it is cities with more than five million inhabitants that are especially at risk, including Mumbai (India), Shanghai (China), Jakarta (Indonesia) and Dhaka (Bangladesh). 75% of people living in the vulnerable areas live in Asia and are affected to a considerable extent by poverty.

(3) **Cities and infrastructures are threatened by extreme weather events.** High population pressure, rising sea levels and the growing intensity of extreme weather events are threatening coastal cities to an ever greater extent (cf. IPCC 2007b: 7; WBGU 2007: 144). By virtue of the concentration of property value in cities, a single event can be expected to generate much greater damage than is the case in rural areas (IPCC 2007b: 178).

(4) **Cities are both affected by and contribute to climate change.** 80% of global CO<sub>2</sub> emissions are produced in cities; at the same time, the problems of cities as urban heat islands are made more severe by global warming. Energy requirements will increase considerably due to cooling requirements, purportedly also causing GHG emissions to rise (cf. IPCC 2007b: 372 et seq.; Stern 2006: 74).

### Relevance for security policy:

- The growing concentration of cities in coastal regions substantially increases the risk of disasters: when disasters occur, they threaten a collapse of public order.
- The negative health impacts of climate change may come to bear in cities (through heat waves, water scarcity) in such a way that, in addition to the direct harm caused to health, a massive loss of government legitimacy occurs.
- Disasters that occur in political and economic centres are particularly sensitive politically.

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<sup>10</sup> This corresponds to an increase from 3.2 billion today to 4.9 billion people.

### 3.5 Governance

The impacts of climate change on individual sectors place considerable demands on both the capacity of states to solve problems and deliver services and on their governance structures. Climate change brings the risk that these structures will erode and that governments will increasingly be unable to perform key functions and tasks. Although there has not been sufficient research to date on the interaction between environmental stress and destabilisation of statehood (WBGU 2007: 43 et seq.), research on environment and security has indicated that political stability, legitimacy and the performance of the political system correlate with vulnerability to conflict (e.g. Homer-Dixon 1999). A number of tendencies can be identified on this basis.

First of all, a distinction is made between the **institutional and political dimension of governance** (BMZ 2007: 13). The first refers to the institutional framework within which governance is embedded. The latter refers to the norms and values that form the basis on which governance decisions are made.

In this connection, the (environmental) impacts of climate change represent, on the one hand, a technical challenge for institutional capacity. An inadequate ability to respond to these impacts may – in addition to the direct consequences – contribute to a loss of legitimacy. On the other hand, however, it is necessary to attend to the issue of whether the government in question is even willing to respond. In the case of Hurricane Katrina, for example, a report from the US Congress stated that there was no lack of technical capacity, knowledge or competence to prevent the damage caused. Rather, warnings – including explicit warnings to evacuate people – were ignored by those in positions of political responsibility when it was already clear that the hurricane was going to strike; the death of numerous people and damage amounting to billions could otherwise have been avoided (Davis 2006: 122).

This political dimension of governance is therefore highly relevant, as it is capable in specific cases of counteracting developments and improvements at institutional level. In the following, however, it is primarily the first, institutional dimension of governance that will be looked at. The political dimension of governance needs to be determined in relation to actual cases.

- (1) **Climate change will weaken economic frameworks and restrict the provision of social services.** This is manifested not only in a loss of state income, e.g. as a result of a decline in agricultural production, but also in the additional costs arising from climate change. These include rising costs in the area of health care, in order to fight the increased spread of diseases (IPCC 2007b: 402 et seq.), and in water supply (IPCC 2007b: 401 et seq.), as well as the rising costs for maintaining and expanding infrastructure services (Stern 2006: 84). In developing countries these costs coincide with a supply situation that in many cases is already deficient, as with water and food, for example (cf. Stern 2006: 75; IPCC 2007b: 399). This loss may lead to the increasing marginalisation of already weak social groups. Depending on the extent of the (politically decided) redistribution of increasingly scarce goods in socio-economic spheres a loss of legitimacy may occur here as well.
- (2) **Climate change intensifies the marginalisation of population groups.** Loss of income, rising costs of living and a lack of autonomous capacity for action threaten to marginalise poor sections of the population even more (cf. IPCC 2007b: 373f; WBGU 2007: 110). This is particularly true for women, who in the aftermath of disasters, for example, often fall victim to attacks (as with the 2004 tsunami). At the same time women are those chiefly responsible for providing for their families (collecting firewood and water) and for looking after them in case of illness. This work is made more difficult due to the growing scarcity of resources and the spread of diseases, so that opportunities for education and participation in public life are further curtailed (Stern 2006: 114). WBGU does not address this set of problems – probably in part because research into the gender-environment-conflict nexus is in its infancy (cf. Krium 2007). Diminishing capacity to provide an adequate (“pro poor”) economic framework will intensify these problems. A situation in which parts of the population mobilise to protest against inadequate supply measures and increasing marginalisation in the wake of acute climate-induced crises may bring with it opportunities for participation on the one hand while also – depending on the societal context – harbouring a potential for violence that may even lead to a destabilisation of statehood on the other.

- (3) **Climate change impacts give rise to problems relating to maintaining the state's monopoly of force both internally and externally.** This arises as a result of both the opportunity costs mentioned above and of the rising costs of maintaining the monopoly on force (CNA 2007: 37 et seq.). Especially in the case of extreme weather events of disastrous proportions, public order may break down locally and produce de facto a lawless zone (cf. WBGU 2007: 106). In many places, the uncontrolled growth of cities already eludes the capacity of states to exert control, representing a concrete challenge to their monopoly on force internally and thus also to their capacity to enforce law and order (cf. Barqueiro 2006; Wulf 2006; Zaluar 2004). The weakening of the political steering capacity of a state can also, due to the impacts of climate change, lead to a situation in which actors prepared to use violence see this development as an opportunity to push through their own interests (cf. Leander 2004). One possible response on the part of the state is to raise the costs of maintaining the monopoly on force and consequently to lose the capacity to transform conflict by non-military means. Here, too, the political orientation of the government is of great relevance: to respond to potential losses of internal security by expanding capacity and implementing excessive repressive measures may reinforce marginalisation and thereby accelerate loss of legitimacy (cf. WBGU 2007: 110). The protection of human rights and the rule of law in times of crisis plays a particular role in this: the disregard or violation of the same may lead to a loss of trust and to defensive reactions on the part of those who actually should have been protected.
- (4) **Climate change may lead to a loss of legitimacy.** Deficiencies in dealing with societal problems exacerbated by climate change may contribute to the delegitimation of governments in office (one recent example are the forest fires in Greece), even if these make efforts to meet the challenges. This may occur in particularly acute form in the case of failing disaster management (cf. WBGU 2007: 110 et seq.). In the case of governments that are not guided by concepts of sustainability or pay no heed to the suffering of marginalised groups, this may happen even more quickly. The resulting consequences may be varied. In China, for example, the number of instances of social unrest resulting from environmental damage in the last few years has risen rapidly. In this regard, WBGU considers it plausible that this resistance will become increasingly organised in the next few years (WBGU 2007: 111). While this must not necessarily lead to violent government overthrow, it does contribute towards political instability.
- (5) **The more fragile a state already is, the stronger the impact of these factors.** Extreme weather events such as Hurricane Katrina show that even industrialised countries can be overstretched by single events. This applies even more in the case of weak and fragile states (WBGU 2007: 166 et seq.). This limited capacity means that climate change will affect weak and fragile states more severely – regardless of whether they are least developed countries or countries at an intermediate stage of economic development (WBGU 2007: 47; cf. also Stern 2006). Climate change will thus multiply the deficiencies in state governance and therefore limit their capacity to actively counter the negative impacts on the different sectors outlined above (WBGU 2007: 166) – these factors may then mutually reinforce one another.

### Relevance for security policy:

- Climate-induced opportunity costs weaken institutional governance structures and hamper the capacity of governments to control events.
- A lack of capacity and loss of legitimacy encourage political destabilisation and weaken the state's capacity for conflict transformation.
- Existing fragility and the political dimension of governance are key influencing factors.



## *4. Specific regional impacts*



The potential destabilising impacts of climate change – as identified by WBGU and CNA in particular – emerge in close relation to sectoral trends on the one hand and existing levels of state capacity on the other. In the following, these perspectives will be brought together for selected regions and their significance for security policy spelled out in regional terms. In order to draw direct conclusions for development cooperation in general and for the work of GTZ in particular, it seems sensible to illustrate the sectoral impacts of climate change in relation to selected partner countries. The selection criteria are, first, the extent to which specific sectors in countries and regions are likely to be affected by climate change and, second, consideration of those countries that are most likely to be severely overstretched by the consequences of climate change. This includes above all fragile states, particularly those that are still in post-conflict situations.

This selection represents an attempt to ensure that the focus is kept, on the one hand, on the security policy implications of climate change and, on the other, on those countries in which extreme events may have a potentially disastrous impact due to the existence of deficient governance structures. Thus in the case of West Africa, for example, Côte d'Ivoire and Nigeria were examined in greater detail than Ghana or Senegal, since the first two states are considered to be substantially more fragile and suffer more from internal conflicts than the latter two. It can therefore also be assumed that, in principle, they will be less capable of coping with the impacts of climate change affecting this region (see Section 4.2).

Three assessments were used to judge which countries should be included in this – essentially illustrative – selection. Clearly it is not possible to use a combination of these approaches to provide an adequate illustration of countries' vulnerability to future climate conflicts. The idea instead is to identify existing "stress levels" which are added to by the impacts of climate change. This overview may help to identify any likely destabilising effects.

The three assessments used were as follows:

- **Failed State Index (FSI)** compiled by the US-based Fund for Peace (FfP). This index seeks to assess the governance capacities of a state necessary for fulfilling certain elementary tasks. In many cases, states will experience growing fragility as a result of climate change before there is any direct outbreak of (violent) conflict, and so the ten most fragile states in each region, according to the current FSI

(as at 2007), were put together and the outcomes of the other assessment approaches added to complement the selection. The FSI is based on qualitative criteria, so that the assessments are indicative (Schneckener 2007).

- **Environmental Vulnerability Index (EVI)** compiled by the South Pacific Applied Geoscience Commission (SOPAC). The EVI was developed in collaboration with UNEP and is comprised of 50 separate indicators. It indicates the vulnerability of ecosystems – which are of prime importance especially in economies heavily oriented towards agriculture – to stress and also incorporates climate change as a factor. The data sources for the EVI, however, are often older than those of the current IPCC reports.

- **Prevention needs** in various countries, determined by the German Institute for Global and Area Studies (GIGA). These needs are related to the prevention of potential or already existing violent conflict. The assessment of prevention needs is not broken down according to individual structural or direct causes of conflict; the same goes for the role of environmental stress.

The indicators are aggregated on a national basis and therefore provide an inadequate depiction of subnational hotspots such as localised state failure in cities (e.g. favelas). It should also be borne in mind that this is only a selection of states based on an intersection of fragile statehood, environmental vulnerability and prevention needs. Accordingly, there is a limit to what can be said on this basis about all fragile states, states with prevention needs or states with a high level of environmental vulnerability.

**The potential consequences of climate change outlined in each case represent merely illustrative, albeit generally plausible, scenarios.** The likelihood that they will come to pass depends not least on the extent to which an ambitious and effective climate regime can be set up at international level. Moreover, in many cases the basic trajectory of environmental trends in the different regions has already been identified. Not all countries at risk will be included in the overview below – this would exceed the scope of this report. Rather, this is a selection of particularly crisis-prone countries. Accordingly, no attempt was made to undertake a wide-ranging examination of current or potentially new (structural) causes of conflict, as a systematic task of this nature could only be conducted on the basis of rough assessments at this point. Instead, a general guide is offered to the various dimensions of securi-

ty and statehood (see Box 2.3), in which the focus has been placed largely on threats to national and international security on account of the countries selected. Equally, not all the main trends identified in Chapter 3 will be systematically examined; the focus will be on those developments crucial for the region in question.

## 4.1 MENA region

### Diagnosis:

Water availability will become a key problem in the near future in the Middle East and North Africa (MENA).<sup>11</sup> This will have far-reaching impacts on agricultural production, desertification and soil salinity, which are already posing severe problems for the entire region (WBGU 2007: 136 et seq.). Migration but especially the lack of legitimacy of state institutions suggests significant implications for security policy.

### Expected impacts of climate change

- As a result of an above-average temperature rise in the MENA region (IPCC 2007a: 867, 874, 883) precipitation will decline by an average of 30% – 50% by the end of the century (IPCC 2007a: 875, 875).
- Temperatures are expected to increase by 2°C as early as 2040 (IPCC 2007a: 874), leading to a reduction in available water resources of between 20% and 30% (Stern 2006: 57).
- Prior to this – in the year 2025 – per capita water availability in the region is expected to decrease to a little more than 500m<sup>3</sup> due to population growth<sup>12</sup> and economic use (UNDP 2006: 136; cf. IPCC 2007b: 435), although availability is highly varied depending on the country concerned.<sup>13</sup>
- With an increase of extreme events, especially heat waves, the risk of failed harvests due to crop failure will further increase (cf. IPCC 2007a: 821, 871). The last 20 years have seen a considerable increase in flooding in North Africa along with its associated damage (Brauch 2006: 20).

### Societal vulnerability

- The decline in water availability will have negative consequences for water-intensive agriculture in the region. Agriculture currently (still) forms a key component of the region's Gross Domestic Product (GDP) – 13.6% on average (World Bank 2007: 16). In North Africa 30.3% of jobs are based in this sector (ILO 2007: 79).

11 Apart from a few local exceptions such as the extremities of the Arabian Peninsula and eastern Iran (IPCC 2007a: 883).

12 Between 2025 and 2040 the population in North Africa is expected to grow by 15% (UNPD 2006).

13 For example, in 2002 Syria had 1,511m<sup>3</sup>, Egypt 827m<sup>3</sup> and Algeria 458m<sup>3</sup> of renewable water resources per capita (World Bank 2007: 142).

- Dependence on food imports will increase markedly (WBGU 2007: 135), a trend that can only be compensated in part by the option of expanding exports in fossil fuels (cf. IEA 2005: 119 et seq.; Brauch 2006: 33).
- Problem-solving competencies within the MENA states are somewhat underdeveloped. Clientelism, rentier economic structures, corruption and deficiencies in education, social welfare and health care have led to a situation in which non-state actors have, in many places, taken over state tasks (Schneckener 2006: 189).
- The legitimacy of current governments is weak in many cases, and political participation is only possible to a limited extent; in addition, democratic elections are frequently considered not to be free, as in the case of Egypt (cf. UNDP 2006a: 29 et seq).
- Political opposition has now adopted a new form of expression, namely terrorist attacks, which have gained in frequency and geographical spread over the last few years (UNDP 2006a: 39 et seq). The response is often in the form of heavier state repression, which frequently fails to distinguish between moderate opposition and one prepared to use violence (UNDP 2006a: 61 et seq.; Schneckener 2006: 188). This situation is compounded by external intervention in the course of the “War on Terror”, which lends additional strength to extremist forces (Schneckener 2006: 189).

**Table 4.1: Risk profiles of selected states in the MENA region**

Countries	Fragility	Environmental vulnerability	Prevention needs	Partner country
Iraq	Alert	•••	Acute	
Lebanon	Alert	••••	Acute	X
Yemen	Alert	•••	Low	X
Israel/Palestine <sup>14</sup>	Warning	••••	Acute	X
Egypt	Warning	••••	Increased	X
Syria	Warning	••••	Increased	X
Iran	Warning	•••	Increased	
Jordan	Warning	•••	Low	X
Algeria	Warning	•••	Low	X
Saudi Arabia	Warning	•••		

a) Fragility: State fragility: Sustainable > Moderate > Warning > Alert.

b) Environmental vulnerability: Ecosystem vulnerability to stress: • = resilient, •• = at risk, ••• = vulnerabel, •••• = highly vulnerable, ••••• = extremely vulnerable.

c) Prevention needs: Divided by GIGA into Low > Increased > Acute. Cell coloured lau: Violent conflict or post-conflict situation.

d) Partner country: X = Partner country, (X) = potential partner country or country in transition.

Empty cell: = not applicable/data unavailable.

Source: FfP 2007, SOPAC 2004, Dückers 2007, BMZ 2007a

<sup>14</sup> Due to a lack of data, fragility and environmental vulnerability were taken from Israel, partner country status, violent conflict and prevention requirements from the Palestinian Territories.

## Security risks resulting from climate change

- In view of MENA's function as a region of transit for migrants on their way to Europe (cf. Brauch 2006: 40 et seq.), it cannot be ruled out that additional tensions will arise in interaction with anticipated scarcity trends. In addition, this migration can be expected to increase due to heightening tensions in the rest of Africa (see below).
- Violent rioting as a result of food scarcity has already occurred in the past, for example in Morocco and Algeria (Brauch 2006: 33; Swearingen 1990). The impacts of climate change threaten to bring about a repeat and perhaps a spread of this problem in the case of there being acute shortages of food.
- In view of climatic trends, the sinking water level of the River Jordan may lead to distribution conflicts between Israel and Jordan (CNA 2007: 30); the Nile is often the focus of public attention as an obvious example of upheaval and potential international (violent) conflicts (see Box 4.1).
- The geostrategic significance of the region means that setbacks may bring external actors into the arena who perceive their (resource) interests to be under threat (CNA 2007: 30 et seq.).

### Box 4.1: Lifeline and powder keg: the Nile and Egypt

The Nile is the main source of freshwater for Egypt, which draws 96.5% of its water from sources outside its borders (World Bank 2007: 146). The decline in precipitation will further reinforce this dependency, while demand for water in Egypt from agriculture will 'escalate' (IPCC 2007b: 445): Even today, 85% of available water resources flow into the country's inefficient irrigation systems. At the same time the population of the country will increase by more than 40% in comparison with 2005 to over 104 million people in 2030 (UNPD 2006). In addition, the Egyptian government suffers from problems of legitimacy, as indicated, for example, by the electoral turn-out in the 2005 elections, which were considered to be undemocratic (UNDP 2006a: 33). At the same time, attacks carried out by groups prepared to resort to violence are on the increase. If water availability were to decrease perceptibly, the associated social and economic problems could intensify existing tensions and generate public support for opposition groups prepared to use violence – particularly if, in addition, potentially millions of people are driven out due to other factors such as rising sea-levels (IPCC 2007b: 327). This mix of factors is aggravated by the foreseeable interest of upstream states, such as Sudan and Ethiopia, to divert more water from the Nile for their own needs: the population in the states bordering the Nile will probably increase from 280 million in the year 2000 to more than 800 million by 2050 (Stern 2006: 113, see Box 4.2). The Nile River Basin Initiative (NBI), among others, was established to avert conflicts over the distribution of water from the Nile (Mason 2004). The question arises, however, as to what contribution the NBI can make towards containing international water conflicts if potential processes of state failure in Egypt should accelerate (WBGU 2007: 135). The problems associated with dependency on external sources of water affect do not Egypt alone: Syria, Bahrain and Kuwait are 80% – 100% dependent on external sources, Iraq 53% (World Bank 2007a: 146).

## 4.2 Africa

### Diagnosis:

Africa is particularly vulnerable to climate stress – in many instances, a reduction in water availability and agricultural land is set to coincide with a growing population. Due to the high number of still-smouldering violent conflicts and post-conflict countries, widespread deficiencies in the sphere of governance as well as possible migration movements, a transcontinental belt of fragile statehood threatens to emerge as, for example, in the case of neighbouring Sudan, Chad and the Central African Republic (CAR) or on the West African coast (Nigeria, Côte d'Ivoire).

### Expected impacts of climate change

- The regional increase in temperature will be higher in Africa than the global mean – in some cases up to 50% (IPCC 2007a: 867). Research findings on the country-specific or subregional impacts of climate change, however, are not entirely clear-cut. For example, contradictory findings exist in relation to changes in precipitation patterns (IPCC 2007a: 867).
- Desertification will advance significantly, especially along the Sahel zone, which stretches from Senegal in the West to Somalia in the East, as well as in southern Africa (WBGU 2007: 136, 138).
- These trends will lead to a decrease in the availability of water resources and agricultural land even as population increases and economic growth expands (cf. IPCC 2007b: 8).
- This development will especially affect those states in which agriculture plays a significant role. The same goes for electricity generation from hydroelectric power stations (WWF et al. 2006: 4; UNDP 2006: 376 et seq.).

### Societal vulnerability

- IPCC emphasises the fact that Africa is particularly vulnerable to climate stress (IPCC 2007b: 827). This is attributed to climatic context on the one hand, and to the continent's weakened adaptive capacity due to the destructive impacts of war, extreme poverty and deficient governance structures on the other (WBGU 2007: 95, 138 et seq.). Africa's raw materials are increasingly becoming the focus of geostrategic interests. The "War on Terror" is also shifting increasingly towards this region (CNA 2007: 20).
- An additional 250-550 million people could be affected by hunger if there is a temperature increase of 3°C (Stern 2006: 104); it is likely that, by 2050, 75% of all undernourished people will be concentrated in Africa (IPCC 2007b).
- Agriculture remains a key sector of the economy, with an average share of 21% (IPCC 2007b: 439; WBGU 2007: 100). However, in some countries agricultural yields could decline by more than 50% by 2020 and incomes by more than 90% by 2100 (IPCC 2007b: 435). There is also the possibility that some grain varieties, such as wheat, will not even be able to be grown anymore by 2080 (IPCC 2007b: 448).
- Urbanisation is constantly on the increase. Furthermore, six of the ten largest African cities are located near coasts (CNA 2007: 22). In West Africa, a roughly 500 km long metropolitan belt is developing between Accra and the Niger Delta, which will be highly vulnerable in the face of any rise in sea level (IPCC 2007b: 450).

## Security risks resulting from climate change

- In the region where the borders of Sudan, Chad and CAR meet in Central Africa, anticipated climate trends could acquire considerable significance for security policy, not least because resource problems are set to intensify noticeably due to the spread of the Sahel zone over the coming years. In the case of Sudan, soil degradation and desertification pose a threat to the fulfilment of basic needs, and they have additionally been at least a contributing factor in sparking off the internal Sudanese conflicts in Darfur and in the South of the country. The same is true for the North of Kenya (Oxfam 2005). These trends could be further aggravated by climate change (cf. UNEP 2007; IPCC 2007b: 442). Similar tendencies are apparent in Chad as well (Morton 2007). The resulting refugee flows in turn threaten to transport these countries' problems into their neighbouring countries. Thus, in addition to transnationalising violent conflicts through cross-border troop movements (both government and rebel), the degradation of resources might also be further advanced. The latter then becomes an additional threat to international security (cf. UNSG 2007, 2007a).
- In West Africa climate change will place many states under stress on account of a series of trends, above all population growth and rapid urbanisation in coastal regions. Nigeria and Côte d'Ivoire are the two countries currently most at risk in this regard because of their fragile statehood and severe internal tensions. The region thus comes under pressure from two sides as a result of climate change:
  - First, encroaching desertification from the countries' interior is increasing, which may accelerate rural migration. The adverse effects of climate change thus undermine not only agricultural production, but also energy provision: Nigeria generates more than 40% of its electricity from hydroelectric power (WWF et al. 2006: 4).
  - Second, sea-level rise poses a threat to populations concentrated in urban coastal regions. In the Niger Delta alone, more than one million people could be driven from the delta for this reason by 2050 (IPCC 2007a: 812). In ad-

**Table 4.2: Risk profiles of selected African states**

Countries	Fragility	Environmental vulnerability	Prevention needs	Partner country
Sudan	Alert	•••	Acute	(X)
Somalia	Alert	•••	Acute	
Chad	Alert	••	Acute	X
Côte d'Ivoire	Alert	••	Acute	X
DRC	Alert	•••	Acute	(X)
CAR	Alert	•	Acute	
Nigeria	Alert	••••	Acute	X
Ethiopia	Alert	••	Acute	X
Zimbabwe	Alert	•	Increased	(X)
Guinea	Alert	••	Increased	X

a) Fragility: State fragility: Sustainable > Moderate > Warning > Alert.

b) Environmental vulnerability: Ecosystem vulnerability to stress: • = resilient, •• = at risk, ••• = vulnerable, •••• = highly vulnerable, ••••• = extremely vulnerable.

c) Prevention needs: Divided by GIGA into Low > Increased > Acute. Cell coloured blue: Violent conflict or post-conflict situation.

d) Partner country: X = Partner country, (X) = potential partner country or country in transition.

Empty cell: = not applicable/data unavailable.

Source: FfP 2007, SOPAC 2004, Dückers 2007, BMZ 2007a

dition, several capitals and cities with more than a million inhabitants, such as Freetown (Sierra Leone), Accra (Ghana), Monrovia (Liberia), Abidjan (Côte d'Ivoire) and Lagos (Nigeria) are located in immediate proximity to the coast.

- Fragility and governance deficiencies in Nigeria and Côte d'Ivoire (WBGU 2007: 45) coupled with the low levels of legitimacy of their governments (cf. International Crisis Group (ICG) 2007, 2007a) make these states vulnerable to additional stress factors.<sup>15</sup> Increasing pressure from climate change from two directions could have a catalytic effect on conflicts over the long term, while further transnationalisation is also conceivable.
- An additional set of problems faced by these two climate-sensitive hotspots arises from their geographical proximi-

ty to one another: the danger is that they will mutually reinforce one another in a negative manner and even destabilise adjacent countries – such as Liberia, Sierra Leone, Ethiopia and the Democratic Republic of the Congo (DRC) – suffering from governance deficiencies. This may give rise to the emergence of a transcontinental belt consisting of mutually reinforcing fragile states, extending from West Africa to the Horn of Africa. This would make it difficult to find solutions to existing violent conflicts and would hamper post-conflict reconstruction in many countries – and it could generate new potential for violent conflict. An increase in migratory and refugee movements heading for Europe via the MENA region is a plausible possibility (see Box 4.1).

#### Box 4.2: Environmental stress and conflict in Ethiopia

Ethiopia is highly climate-sensitive. More than 80% of the population works in agriculture and generates half the country's GDP – at the same time, 46% of the population is classified as undernourished and about 1.3 million people were anticipated to receive food aid in 2007 (WFP 2007). Over 90% of electricity is generated from hydroelectric power (WWF et al. 2006: 4). 78% of the population has no access to clean water (UNDP 2006: 308). According to estimates, the population will increase from 75.6 million at present to 97.6 million in 2015. Of these additional people, 11 million – roughly half – will be living below the poverty line due to environmental factors (UNDP 2006: 157). Both water supply and agriculture are highly dependent on precipitation. As a result of climate change, however, the average amount of annual precipitation will further decrease, while at the same time extreme rainfall events will gain in intensity (cf. WBGU 2007: 62; IPCC 2007a: 870). Unless water storage capacity is considerably expanded, however, these events will not be able to make up for the general decline in precipitation. The alternative of diverting more water from the Nile is already provoking resistance from Egypt (see Box 4.1; Flintan/Tamrat 2002: 293 et seq.). At the same time, droughts are set to last for longer and become more intense; even now droughts are the most frequently occurring cause of natural disasters in Ethiopia. Thus, climate change reinforces previously existing competition for resources. Ethiopia finds itself in a situation of uneasy peace with its neighbour Eritrea and has a long history, domestically as well, of violent conflict over political autonomy and co-determination regarding water and soils (Tetzlaff/Jakobeit 2005: 83 et seq.). On top of this, the country is located between two conflict hotspots similarly influenced by environmental factors – Sudan and Somalia (cf. UNEP 2007). Currently, 90,000 refugees from these countries are living in Ethiopia (UNHCR 2006). Ethiopia's neighbouring states are similarly prone to the impacts of climate change, so that domestic problems acquire an additional, regional dimension. Viewed historically, a comparable combination of factors consisting of famine, economic recession and political instability set the stage for the overthrow of Emperor Haile Selassie in 1973/74 (cf. Comenetz/Caviedes 2002: 113).

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<sup>15</sup> Nigeria has to cope in addition with several armed insurrections (HIK 2007: 29 et seq.), while Côte d'Ivoire only recently forged a fragile peace (ICG 2007).



## 4.3 Asia and Pacific

### Diagnosis:

Sea-level rise, the intensification of extreme weather events and glacier melt in the Himalayas all represent substantial pressures upon agriculture in large river deltas and in small island states. A number of fragile states are affected by these developments. While Bangladesh is often mentioned as a common example of how a country can be affected by climate change, potential destabilisation in Pakistan may bring with it significant implications for the international security architecture.

### Expected impacts of climate change

- South Asia is warming up faster than the global average (IPCC 2007b: 472). A trend towards an increase in weather extremes has been identified, with heavier precipitation occurring during the rainy season and periods of drought intensifying and being accompanied by more frequent and more severe heat waves (IPCC 2007b: 473, 478; WBGU 2007: 146; Stern 2006: 104).
- Extreme events will increase in severity and frequency due to climate change. This includes landslides/mudslides (due to heavier rainfall), floods (due to heavier rainfall as well as glacier melt), hurricanes and cyclones (due to global warming, sea-level rise) (IPCC 2007b: 472 et seq., 479).
- The IPCC anticipates a sea-level rise of at least 40 cm by 2100. However, once a rise of 30 cm has been reached, coastal areas threatened by storm surges will expand by a factor of 5-6 (IPCC 2007b: 484 et seq.), and this will have an impact on nearly 40% of Asia's population. In Bangladesh alone, 35 million people living near coasts will experience the effects of this impact (Stern 2006: 74), which in turn may trigger increased migration to India (WBGU 2007: 146 et seq.). Even a minimal rise in sea levels and/or extreme events will contribute considerably to the salinisation of densely populated coastal regions under agricultural use, due to low-lying coasts and river deltas (especially in Bangladesh) (IPCC 2007b: 477 et seq.). The impacts on small island states in the Pacific will, in many cases, mean no less than the loss of national territory and forced outward migration (cf. Romer 2006).
- Glacier melt in the Himalayas threatens the water supply of up to 500 million people. Given current warming trends, the Himalayas may be ice free on them as soon as 2035 – or sooner if global warming were to speed up (IPCC 2007b: 483, 493). Independently of this, the amount of water available in India will decrease by 2050 from 1,820m<sup>3</sup>/person to about 1,120m<sup>3</sup> (IPCC 2007b: 484). However, water runoff will increase by up to 30% – 40% over the next few decades, due partly to heavier precipitation and partly to glacier melt (IPCC 2007b: 184).

### Societal vulnerability

- Half of the world's irrigated agricultural land is located in Asia, although in large part non-sustainable irrigation systems are in use (UNDP 2006: 177). In parts of India today, the water table is falling by up to one metre every year, posing a substantial threat to agricultural production (UNDP 2006: 14). The extent of groundwater loss already poses a considerable risk for future food security.
- In connection with the CO<sub>2</sub> fertilisation effect, grain production could increase by up to 30% by 2100 as a result of global warming (IPCC 2007b: 479 et seq.); in the north of India, this figure may even reach 70% (Stern 2006: 104). However, statements regarding this trend should be treated with caution due to the large number of possible influencing factors. Since the available area of cropland has already largely been exhausted, it is likely that intensified land-use will occur (IPCC 2007b:

482). Overuse of soils, however, can be expected to lead to a reduction in yields over the long term (cf. WBGU 2007: 146). In addition, up to 18% of cropland could be lost by 2080 due to salination and desertification (Stern 2006: 101 et seq.).

- The regional economy as a whole, moreover, is heavily oriented towards the monsoon; changes in patterns of precipitation (regardless of their nature) will thus have far-reaching consequences for the entire economy (Stern 2006: 59, 104; Tänzler et al. 2006). For the region's people, too, incipient improvements in access to clean water and in the sanitation infrastructure also risk being cancelled out due to the climate trends outlined above. In absolute global terms, the most people without access to clean water today live in Asia (UNDP 2006: 5). Two out of three people in South Asia today also have no access to any sanitary infrastructure (UNDP 2006: 51).
- Asia's mega-deltas constitute an area at risk given climate change trends (cf. IPCC 2007b: 858 et seq.). Two of the three most vulnerable deltas (Ganges-Brahmaputra and Mekong) are located in South Asia; a further delta at risk is the Godavari Delta on the east Indian coast. Both the population as well as key infrastructures in these regions show a high level of vulnerability to environmental stress.

## Security risks resulting from climate change

- Bangladesh, Nepal, Myanmar, Pakistan and Sri Lanka are the fragile states most acutely threatened in terms of the FSI. They are all partner countries of German development cooperation (Myanmar potentially). Overall, the climate trends for South Asia appear to be so serious that substantial upheavals can be expected to occur. One example of this are the developments that took place in 1974 in Bangladesh in the wake of catastrophic floods and the impacts of a typhoon, when first a presidential dictatorship came to power and then the military formed a transitional government (WBGU 2007: 35).
- Relations between nuclear powers Pakistan (see Box 4.3) and India are critical, not only because of the Kashmir conflict (despite some signs of a reduction in tension). Water issues on the Indus have also led repeatedly to disputes in the past (cf. Tänzler et al. 2006).
- It is also true for India that distribution conflicts over water already occur between the various provinces today (WBGU 2007: 146; Tänzler et al. 2006). The scope of these conflicts could increase markedly in view of the potentially far-reaching changes to the monsoon and the dwindling availability of water in the Himalayas; they could also spread in virulent fashion to include cross-border water issues with Pakistan or Bangladesh.
- China is already experiencing a range of social tensions today on account of environmental pollution. Climate change will add to the existing environmental stress and, in combination with sea-level rise and increasingly intense tropical cyclones, affect the heavily populated and economically important centres on the Chinese east coast. It remains to be seen what the geopolitical impacts of a growing loss of steering capacity on the part of the Chinese government will be.
- In South Asia the crisis hotspots are located in close proximity to one another, as was similarly demonstrated in the case of Africa. It is not unlikely that extreme climatic events could occur simultaneously, coinciding with long-term trends such as desertification and dwindling water availability. If, for example, floods in Bangladesh and the associated migration to India occur at the same time as environmental stress in the northeast of India, these mutually reinforcing trends could lead to regional instability. This would become even more severe if the problems of poverty, poor water supply and food security are not adequately addressed.

**Table 4.3: Risk profiles of selected states in Asia and the Pacific**

Countries	Fragility	Environmental vulnerability	Prevention needs	Partner country
Afghanistan	Alert	•••	Acute	X
Pakistan	Alert	•••••	Acute	X
Timor-Leste	Alert		Acute	X
Nepal	Alert	•••	Acute	X
Sri Lanka	Alert	••••	Acute	X
Bangladesh	Alert	••••	Increased	X
Uzbekistan	Alert	•••	Increased	(X)
Myanmar	Alert	•••	Low	(X)
North Korea	Alert	••••		(X)
Solomon Islands	Alert	•••		

a) Fragility: State fragility: Sustainable > Moderate > Warning > Alert.

b) Environmental vulnerability: Ecosystem vulnerability to stress: • = resilient, •• = at risk, ••• = vulnerabel, •••• = highly vulnerable, ••••• = extremely vulnerable.

c) Prevention needs: Divided by GIGA into Low > Increased > Acute. Cell coloured blue: Violent conflict or post-conflict situation.

d) Partner country: X = Partner country, (X) = potential partner country or country in transition.

Empty cell: = not applicable/data unavailable.

Source: FFP 2007, SOPAC 2004, Dückers 2007, BMZ 2007a

## 4.4 Latin America and Caribbean

### Diagnosis:

For the Latin America and Caribbean region the impacts of climate change will take very different forms, depending on geographical location. Non-sustainable management of natural resources has already led to local conflicts over resources in the past. The influence of fragile statehood is limited (Colombia, Haiti), and yet inequitable access to resources in combination, for example, with cities effectively impossible to control, such as Sao Paulo, could noticeably intensify the potential for conflict under conditions of climate change.

### Expected impacts of climate change

■ Whereas there are no clear trends regarding the extent of regional warming (IPCC 2007b: 584, 894; WBGU 2007: 156 et seq.), a rise in temperature of 1°C compared with the pre-industrial era can be sufficient to bring about the disappearance of the glaciers in the Andes. This

will affect the water supply of 50 million people (Stern 2006: 57). In view of the warming that has already occurred, a rise of 1°C could be reached in 15 years already and be hard to prevent from happening due to the current concentration of GHGs in the atmosphere.

### Box 4.3: Karachi – Pakistan’s Achilles heel?

The city of Karachi forms the main hub of Pakistan: 65% of Pakistani state revenues are generated here. It hosts the largest airport and the two largest ocean harbours in Pakistan. Nearly 10% of Pakistan’s population today – 14.5 million people – live in Karachi, and the trend is rising (Karachi District Government 2007, 2007a). As such, Karachi is of crucial significance for the stability of a fragile state in whose western quarter an armed uprising is in progress (ICG 2006), whose northern regions serve as a retreat for the Taliban, which has an ongoing territorial conflict with India in the East, and whose government is regarded as illegitimate by its own people (ICG 2007b). Karachi was a target for terrorist attacks in 2006. The city’s location by the sea makes it vulnerable to extreme weather events: more than 200 people were killed as a result of heavy rainfall in June 2007. Violent uprisings occurred in response to the inefficient handling of the crisis by the authorities responsible. Climate change will cause extreme weather events in South Asia to gain in intensity, while at the same time sea-level rise is threatening the coasts (IPCC 2007: 479; WBGU 2007: 143 et seq.). A catastrophic natural event here could have a destabilising impact (cf. WBGU 2007: 103f et seq.). The impacts of a collapse of public security in Karachi, especially if this led to city standstill, could spread throughout the country and serve as a focal point for anti-government groups in Pakistan. In addition to national tensions, then, the risk posed by a failing state with nuclear weapons could become a problem of international security.

- Non-sustainable soil use will further accelerate the consequences of climate change such as desertification. By 2050 up to 50% of Brazil’s surface area could be affected. In addition, freshwater supplies are at risk due to the pollution of groundwater resources (IPCC 2007b: 583, 587). The impacts anticipated if the Amazon turns into savannah are also assessed as being serious; this could be triggered by accelerated warming and desertification as well as ongoing forest clearance. A massive loss of biodiversity, among many other things, would be the consequence.
- Extreme weather events will increase and the differences between the rainy and dry seasons will become much more pronounced (IPCC 2007b: 583, 586). Numerous problems arise from this for low-lying coastal areas: (1) sea-level rise, (2) more powerful storms, (3) heavier precipitation and (4) water scarcity during the dry season (IPCC 2007b: 586).
- In the Caribbean the unavoidable rise in temperature of a further 0.6°C by around 2030 can be expected to give rise to an increase in extreme weather events, e.g. hurricanes (cf. WBGU 2007: 149). A further risk is sea-level rise. In addition to direct damages caused by storms and floods, there is a risk of greater soil and coastal erosion as well as the salination of coastal areas in the wake of floods. This will have negative effects on groundwater and soil quality (IPCC 2007b: 696 et seq.).

### Societal vulnerability

- The dual problem of extreme weather events and sea-level rise especially affects the large coastal cities of Latin America such as Rio de Janeiro, Buenos Aires and Lima (cf. IPCC 2007b: 586 et seq., 600). One key problem is that urbanisation currently eludes control and indeed already exceeds the capacity of cities to absorb the influx. By 2015 levels of urbanisation will probably have reached 80%. Thus, alongside the expansion of slums, settlement is also taking place in areas at risk from mudslides or hurricanes, for example (IPCC 2007b: 584, 586).
- The expansion and improvement of necessary infrastructures of these and other coastal cities is barely keeping pace with their inadequately controlled growth. One example is the potential contamination of drinking water supplies as a result of overstretched wastewater systems. The combination of these effects may further the spread of disease (IPCC 2007b: 587 et seq.). As a result of a heavy economic dependency on tourism, especially in the Caribbean, the climatic trends mentioned above will have substantial economic impacts (cf. IPCC 2007b: 586).
- Extreme disparities currently prevail with regard to income and access to education, health care and other services in Latin America. Ten per cent of South America’s GDP continues to be generated in the agricultural sector

## Security risks resulting from climate change

- (IPCC 2007 II Ch13: 591). A further factor is that indigenous groups are increasingly challenging established elites (WBGU 2007: 154 et seq.).
- Water problems are expected to intensify– the number of people in the region experiencing water stress could rise from 22.2 million in 1995 to as many as 81 million in 2020 (IPCC 2007b: 597). This may further exacerbate national and international rural migration (cf. Simms/Reid 2006: 40).
  - Existing competition over land use between smallholders and industry (agriculture and forestry, mining activity, energy crops) will further increase as a result of desertification and soil degradation (cf. WBGU 2007: 156; Carius et al. 2006: 42) and have adverse effects on the region's biodiversity (IPCC 2007b: 613). In addition, many countries are dependent for their electricity supply on hydroelectric power stations, whose productivity may decline in the wake of global warming and droughts (IPCC 2007b: 586, 597).
  - The concentration of industrial facilities in the Caribbean gives rise to the risk of environmental destruction resulting, for example, from oil platforms toppled by storms. This constitutes an additional factor that could burden the marine ecosystem (e.g. fisheries) (WBGU 2007: 151 et seq.).
  - Non-sustainable management of natural resources has already led to local conflicts over resources in the past. In large parts of Latin America this constitutes an additional factor that amplifies the impacts of climate change (IPCC 2007b: 599; WBGU 2007: 154). Due to relative stability and a high level of development, however, 'Haitian conditions' are unlikely to prevail in the region in the short term (cf. WBGU 2007: 159). On Haiti itself, it is unlikely that there will be any improvement in the environmental situation, however, which in the medium term could cause migration movements to spread to the Dominican side of Hispaniola (Diamond 2005: 354 et seq.). The increase in extreme events can also be expected both to steady and strengthen existing intraregional as well as extra-regional migratory movements, especially to the USA (cf. WBGU 2007: 150). The border region between the USA and Mexico today is already both a social and an ecological hotspot.
  - Climatic trends may further reinforce the tense social situation that exists in many places due to grave inequalities within the population. One consequence could be the spread of existing zones of lawlessness and statelessness in urban and rural areas. It is not uncommon for organised crime and criminal gangs to fill the gap left by the state in these regions (cf. Peetz 2007; Barqueiro 2006). In many places, one response to these zones of failing statehood is to arm private security services. This occasionally leads to civil war-like situations in which the police clashes with organised crime (Peetz 2007: 2; Barqueiro 2006: 14). The state of affairs could develop into a social tipping point as a result of critical climate trends and ongoing urbanisation.
  - After a series of changes of government, efforts have been made to confront these established, asymmetric social structures. Venezuela and Bolivia are examples of this. A referendum on greater regional autonomy held in the resource-rich provinces of Bolivia illustrated the tensions contained in the clash of interests over access to resources (Goedeking/Zuazo 2006).<sup>16</sup>

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<sup>16</sup> In Venezuela, however, the government is becoming increasingly autocratic (cf. Alvarez 2006; Maihold/Husar 2005).

**Table 4.4: Risk profiles of selected states in Latin America and the Caribbean**

Countries	Fragility	Environmental vulnerability	Prevention needs	Partner country
Haiti	Alert	••••	Acute	(X)
Colombia	Warning	•••	Acute	X
Bolivia	Warning	••	Increased	X
Guatemala	Warning	••••	Increased	X
Dom. Republic	Warning	••••	Low	X
Nicaragua	Warning	•••	Low	X
Ecuador	Warning	•••	Low	X
Cuba	Warning	••••	Low	
Peru	Warning	••	Low	X
Venezuela	Warning	••		

a) Fragility: State fragility: Sustainable > Moderate > Warning > Alert.

b) Environmental vulnerability: Ecosystem vulnerability to stress: • = resilient, •• = at risk, ••• = vulnerable, •••• = highly vulnerable, ••••• = extremely vulnerable.

c) Prevention needs: Divided by GIGA into Low > Increased > Acute. Cell coloured blue: Violent conflict or post-conflict situation.

d) Partner country: X = Partner country, (X) = potential partner country or country in transition.

Empty cell: = not applicable/data unavailable.

Source: FfP 2007, SOPAC 2004, Dückers 2007, BMZ 2007a

#### Box 4.4: Climate change in Colombia – extending the battle field?

The only armed conflict in Latin America today is currently being fought in Colombia. Despite some initial success in negotiations, there is no indication that the conflict will end soon (ICG 2007c). Colombia is considered to be one of the most fragile states, whether in Latin America or elsewhere (WBGU 2007: 45). The conflict is financed by the sale of coca crops, the growing of which causes considerable environmental harm: forest clearances carried out to make space for plantations accelerate soil erosion and biodiversity loss. At the same time the use of fertilisers and pesticides leads to a decline in soil and groundwater quality (Hyde Hecker 2005). Coca growing is currently concentrated in the west, central areas and north of Colombia (UNODC 2007: 62). Climate change will lead, especially in the west and south of Colombia, to an increase in precipitation, while in the north and northeast a decrease is expected (IPCC 2007a: 895). This will accelerate existing soil erosion on the one hand and lower the productivity of crop-growing areas in the north on the other. This could increase the pressure to shift the growth of drug crops further towards the southeast of the country. The impact is a possible expansion or at least a shift of the conflict zones to regions currently only minimally affected. There is evidence suggesting that this is already happening (Hyde Hecker 2005).



*5. Conclusions for German  
development policy and  
cooperation*



UN  
climate change  
conference 2007

Bali-Indonesia  
3-14 November 2007



The following proposals for action are primarily directed, in Section 5.1, at policymakers in BMZ, as it is here that, in the view of the authors, the key strategic positioning in terms of development policy is required. They point towards a need for the integration of previously largely separate and sectoral approaches and for a fundamental long-term orientation of development cooperation activities in response to cause-effect linkages that are complex and exert their effects over long timeframes. Sections 5.2 to 5.4 elaborate recommendations for the sectoral programmes of GTZ. With regard to climate change mitigation and disaster risk management in particular, these recommendations can in many instances build upon existing technical and financial cooperation activities and strategies, which are already tackling the challenges presented by climate change through an array of projects and programmes (see, for instance, Petersen/von Bechtholsheim 2007; Hünne Meyer 2007).

## 5.1 Strategic challenges for BMZ

In light of the anticipated impacts of global climate change upon existing and future conflicts and upon regional and global security, climate policy is acquiring ever greater relevance. Climate policy and relevant sector policies and interventions carried out within the framework of German development cooperation play a major preventive role in this context: first, largely to prevent potential climate risks and their adverse effects and, second, to develop strategies for adaptation to unavoidable impacts. The scope of action of development cooperation will face additional challenges. The importance of development institutions in international policy will continue to grow accordingly. If the impacts of climate change analysed here are taken seriously within development institutions and are integrated accordingly within sector programmes and sector policies, new goals and options for action emerge.

Numerous institutions have underscored the relevance of climate change to questions of development, stability and peace. The urgent task of forging a convincing post-2012 regime to succeed the Kyoto Protocol in combination with further strategic actions setting the course over the coming five to ten years and considered urgent, have generated strong political momentum. This momentum must now be used. At European and global level, and in concert with the donor organisations represented in the Development Assis-

tance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD), three arenas for strategic action emerge for the coming months:

**1. European Commission and European Council (October 2007 – June 2008):** In October 2007 the Council Secretariat and the European Commission produced the first draft of a joint communication on climate change and security and deliberated it in the relevant Council bodies. The communication is to be adopted at the 2008 Spring Summit under the Slovenian Council presidency and corresponding conclusions integrated within the Council decisions at the end of June 2008. The German Federal Environment Ministry (BMU), together with the Slovenian Council presidency, is currently planning a conference of high-level government representatives in April 2008 to debate the findings and recommendations of the communication of the Council and Commission. The period between the submission of the draft communication and the Council conclusion in June 2008 offers a unique window of opportunity to make an active German contribution to the development policy aspects.

**2. OECD DAC FSG-CPDC work programme (September 2007 – June 2008):** The new work programme for 2009 and 2010 of the new joint OECD DAC working group – consisting of the Fragile States Group (FSG) and the Conflict, Peace and Development Cooperation Group (CPDC) – is expected to include the theme of climate and security, although not as a priority. Furthermore, previous work performed by relevant OECD networks such as GOVNET and ENVIRONET on the theme of environment, natural resources and security is to be taken up and carried forward. Building upon first deliberations (proposal for the work programme) and the findings of the present report, BMZ and GTZ should play a key role in developing and implementing the climate and security aspects of the work programme. Donor coordination, harmonisation and mainstreaming are expected to be the main issues addressed by the programme.

**3. Shaping the future climate regime (October 2007 – ..):** The findings of the IPCC reports played a major role during the Bali negotiations of the United Nations Framework Convention on Climate Change (UNFCCC). Here the opportunity arises to create a foundation for new international alliances geared towards making adaptation to climate change and (conflict-sensitive) preparation for its ad-



verse effects a key issue of negotiations. Although no linkages yet exist between the UNFCCC process and the theme of climate and security, strategies now need to be developed within the German federal government and in consultation with key European partners (notably Great Britain and Denmark) for feeding the outcomes of the present report and the WBGU findings into the further negotiations on the design of a future climate regime following the intergovernmental conference in Bali.

### 5.1.1 Internal strategy formation

It is important to launch a strategic discourse within development cooperation institutions. The aim of this should be, in light of the challenges outlined, first to clarify the relevance of the nexus between climate change and security for development cooperation, then to derive a political mandate and, finally, to communicate this. Starting points and theses for such a discourse are contained both in the present report and in the WBGU study. To engage in the arenas of action outlined above, it is important that BMZ clarifies its position early on and identifies those aspects of the debate that are central to the development policy perspective and should be addressed as a priority. It follows that the portfolio of the implementing organizations (GTZ, KfW, GIZ, InWEnt) needs to be reviewed specifically and in depth with regard to the existing toolbox and country priorities and themes. These findings can then underpin any necessary further consultation within the German federal government, especially on the question of which organizations are to adopt a lead role in the arenas outlined.

The scope of approaches envisaged is a key issue. This can range from specific sectoral approaches (e.g. conflict- and climate-sensitive programme and project design in fragile states) to global structural policy approaches (e.g. fundamental and long-term restructuring of relations between the European Union, China and USA). The recent withdrawal of the Chinese government from the Sino-German dialogue on the rule of law has shown once again that sectoral approaches (dialogue on the rule of law in the present case) are now intimately linked to overarching issues and restrictions arising in the arena of international policy. This gives an impression of possible future fault lines in international policy, as set out in the WBGU study, that go far beyond the classic scope and toolbox of development cooperation.

This presents a need to find new forms of cooperation with partner countries.

### 5.1.2 Strategic arenas of action

The following arenas of action are the principal ones requiring a strategic positioning by BMZ:

**The climate-security nexus as a theme of climate negotiations:** In addition to the relevant studies, which also underpin the present report, the security argument was used by various decision-makers throughout the year 2007 within the context of the climate debate to attract political and public attention. Nonetheless, the debate on climate and security held in the UN Security Council in April 2007 left the impression that there are various reservations against placing the potential impacts of climate change in a security policy context. A strategic approach therefore requires also considering – in addition to the opportunities – the risks associated with a substantive and strategic positioning focussing on the climate-security nexus. There is a risk that narrowing the perspective on conflicts to their climate-induced factors can be misused if the responsibility for conflicts in developing countries is delegated to the industrialised world as the principal generator of climate change. At the present time it appears neither likely nor purposeful that the agenda of the UNFCCC climate regime will be expanded to take in a security policy dimension.

Despite all side avenues such as the G8 negotiations, the key moves putting international climate policy on course over the next three years will take place within the scope of the UNFCCC. The present report shows that the issue of adaptation will need to be tackled with greater urgency, not least in order to boost confidence among the most affected states in the multilateral process. The first priority in this respect is surely to design a robust framework for sustained action, which would remove the fragmentation currently prevailing in the sphere of adaptation. In the view of the developing countries, and of India and China, responsibility for climate change rests primarily with the industrialised countries. As a result, climate negotiations could be overcast in the future even more by antagonisms between the principal generators and those affected. This would hamper international climate negotiations and would make calls for compensation payments more probable.

**Global structural policy and energy security:** WBGU outlines six threats to international stability and security<sup>17</sup> against the backdrop of four climate-induced conflict constellations: (1) degradation of freshwater resources, (2) decline in food production, (3) increase in storm and flood disasters and (4) environmentally-induced migration. As the climate-induced conflict constellations, taken together, would overstretch the global governance system if mitigation and adaptation strategies fail, the WBGU report firmly underscores the importance of responding to climate change at a geopolitical and (global) structural policy level.<sup>18</sup> Measures to address long-term threats to international security therefore open up new options for dialogue, especially with the anchor countries. These questions cannot be resolved at the level of the implementing organisations of development cooperation, but require strategic positioning on the part of BMZ.

Complementing the multilateral process, new partnerships will be necessary, especially with major emitters. The capital investments and resource requirements associated with the economic growth of rapidly emerging economies will decisively determine the global emissions path for the next decades. This is why dialogue on climate protection must be linked systematically with questions of energy security: Competition for energy and resources will intensify and will further destabilise the countries affected by climate change and by weak or fragile statehood. Fostering energy security and reducing dependence upon imported energy will therefore be elements of future negotiations, also with fragile states. New cooperation needs arise here, which need to be underpinned by new forms of dialogue.

**Differentiated dialogue with transition countries:** Western industrialised states may face a crisis of legitimacy in the international system if they fail to attain climate change mitigation goals, which will promote unilateral action will promote unilateral action (the primacy of national interests) on the part of strategically important transition countries, and will greatly hamper cooperative, multilateral agreements on

climate and also on other important fields of development policy. Regional mechanisms for dialogue are a possible response here, one that needs to be differentiated from country to country. For dialogue with China, in particular, options need to be designed that go beyond the bilateral deliberation of climate and resource issues: It is essential to do greater justice to the ever more important role of China in global politics and to create an awareness in China of regional developments and adaptation to climate change, for instance in Africa. One option would be to initiate tripartite cooperation ventures with China and other partner countries in order to give clear climate policy signals, for instance through joint programme-based approaches.

**Building and harnessing international institutions:** The climate-security nexus can also be taken as an opportunity to launch a debate on the role of global institutions in relation to climate security issues. WBGU argued in its report for a range of institutional approaches aiming primarily to reform existing international institutions such as the UN or the world trade regime. New institutions and regimes (analogous to the Conference on Security and Cooperation in Europe – CSCE), strengthening the United Nations Economic and Social Council and upgrading UNEP to become a world environment organisation are logical approaches for reform in themselves, but present major problems of acceptance and enforcement. Proposals aiming to establish a world environment organisation under the United Nation’s umbrella (United Nations Environment Organisation – UNEO) – such as WBGU has proposed in its latest report and in previous reports on other environmental issues of global concern – do not appear expedient in light of the challenges outlined in the present report. This proposal already encountered considerable resistance on the part of G77 and other states several years ago, and is also a contentious issue within the German federal government. A fundamental problem is that calls for new global institutions tend to elevate the question of institutional design above the salient question of their concrete function. The present report proposes embarking upon a

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17 (1) Possible increase in the number of weak and fragile states as a result of climate change, (2) risks for global economic development, (3) growing distributional conflicts between the main drivers of climate change and those most affected, (4) risk to human rights and the industrialised countries’ legitimacy as global governance actors, (5) triggering and intensification of migration and (6) overstretching of classic security policy.

18 (1) Shaping global political change, (2) reforming the United Nations, (3) ambitiously pursuing international climate policy, (4) transforming energy systems in the EU, (5) developing mitigation strategies through partnerships.

comprehensive and systematic debate on matters of substance, which could then lead on to the question of which institutional options are to be preferred at global level. Potential responses should not, however, be focussed necessarily or narrowly on the possibility of establishing a UNEO. Instead, it needs to be kept in mind that the international financial institutions play a key role wherever the issue of mustering additional resources in the field of adaptation arises. Beyond the question of financing, consideration should be given to whether regional arrangements might not be a more effective form of institutionalisation, as the issue at hand is often one of concretising regional adaptation to climate change and developing management strategies that may be transboundary in nature. Such arrangements can make use of the experience gathered in German development cooperation in developing and implementing transboundary environmental cooperation as an indirect instrument of peacebuilding (cf. Carius 2007).

### 5.1.3 Strategic exigencies

The potential impacts of climate change on security, stability and development and their complex interplay call for long-term policy planning. This must employ integrative approaches in order to do justice to the complex challenges at both sectoral and regional level. BMZ and its implementing organisations will, however, only be able to adopt a long-term outlook and pursue integrative strategies if they have access to the requisite human and financial resources.

**Long-term outlook:** The WBGU has made a key contribution to revealing the long-term nature of the destabilising consequences of climate change. Prevention and adaptation need much longer periods for strategy and programme planning than other sectors. Taking a long-term perspective is not new to development cooperation. It is, however, something that will gain fresh prominence in view of the urgency of present climate change mitigation measures and adaptation strategies – not least because adaptation strategies are planned for a peaceful setting, but then need to be implemented in a setting affected by conflict. What a long-term outlook specifically calls for has been elaborated in the present report in relation to the key sectors affected. The issue of what conclusions are to be drawn from this for the various levels of action of German development policy needs to be resolved in a process of strategic discussion with and within BMZ

and within the German federal government in general. For practical cooperation with partner countries, new priorities can be formulated in the course of government negotiations in a manner similar to that already adopted in some cases in the field of disaster risk management for certain hotspot countries. Without concrete mandates established in government negotiations, the implementing organisations will not be in a position to implement tangible activities to any noteworthy degree.

**Integration:** Sector approaches need to take account of future climate risks. To that end, sector programmes and regional divisions must develop integrative strategies and programmes. This needs to involve formulation of goals and methods for integrative approaches, yet also determination of limits in order not to overstretch strategy and planning processes. The specific features of such integrative approaches cannot be formulated in an abstract manner. With this understanding, the present report urges pilot projects to be undertaken for selected states, for which transparent methods need to be agreed within the OECD DAC and whose implementation must be coordinated with other donors. A similar approach is also emerging at European level. It is expected that the wording found by the Council Secretariat for a joint paper to the Commission on climate and security will also envisage regional pilot studies.

**Capacity development:** In view of the importance of the linkages between climate and security, climate-related development cooperation needs to be equipped with further financial and human resources over the medium term. In light of the integrative approaches needed, this applies to sector projects and programmes in the fields of crisis prevention and conflict transformation, climate change mitigation and disaster risk management – but also to other climate-relevant sector programmes. More importantly, the issue of resourcing will crucially determine whether relevant and tangible approaches are actually developed and implemented in bilateral cooperation.

Building the capacities that this requires in German implementing organisations is a challenge that needs tackling. To the extent that mitigation and adaptation measures come to be seen as a contribution to international prevention policy, the politically sensitive issue of raising the levels of funding could be placed in the context of the discussion on how to use the revenue from the upcoming auctioning of emission rights. Only if funding provision is enhanced will the imple-

menting organisations be in a position to perform the exploratory regional studies outlined in the following and to build their methodological competences.

## 5.2 Challenges for development cooperation: Crisis prevention

The impacts of climate change will further heighten the complexity of and interplay among conflicts and their causes. Conflict dynamics will intensify, and previously locally limited conflicts may possibly spread over the long term to engulf entire regions. In this setting, climate policy, disaster risk management and relevant sector policies are likely to become key elements of structural prevention policy geared to avoiding and containing future crises. The demands such policies will need to meet in terms of crisis prevention and conflict transformation are not clear yet, and nor is the question of which crisis prevention tools may be applied. The priorities pursued by GTZ's Crisis Prevention and Conflict Transformation Programme<sup>19</sup> already offer approaches and tools which can be used to address climate-induced conflicts.<sup>20</sup>

In this setting, the following development cooperation (DC) approaches appear expedient:

**Country pilot studies on climate change and conflict:** The present report proposes exemplary, conflict-related country analyses (pilot studies) for selected fragile or conflict-determined states that are highly vulnerable to environmental changes. It needs to be assessed for such countries whether and how future climate risks may critically influence existing conflict

constellations or state fragility. This question can be integrated within existing formats and methods for country conflict analyses (e.g. in the brief political-economic analysis reports commissioned annually by BMZ) and does not need new and additional studies. While previous conflict-related country analyses have concentrated on dynamics and interactions in already existing conflict constellations, future studies will need to include on long-term climate impacts and their effects upon latent and potential conflicts.

**Refinement and adaptation of methodology:** To this end, a suitable methodology for capturing climate risks and their impacts upon existing and future conflicts must first be developed. An essential first step is to concretise the identified regional or national climate hotspots at sub-state level and their potential regional interaction. Here scenario techniques can be used, which can build upon, among other things, approaches currently being developed at German Development Institute (DIE). Furthermore, corresponding IPCC scenarios could be taken as a basis and further refined.

**Conflict relevance of adaptation strategies:** A further field of action is the production of climate-related adaptation strategies for fragile states that must go beyond climate variability to embrace potential climate-induced conflicts. Here adaptation strategies need to take account of the special conditions in fragile and post-conflict states and must thus capture, to a far greater extent than in the past, political options in addition to technical ones. As the development of adaptation strategies has in itself scarcely followed a uniform methodology to date and as it must be expected that the conflict-relevant impacts of climate change will not be taken fully into account, it is important that the Crisis Prevention Programme provides sub-

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19 Further development of strategies and instruments for crisis prevention, conflict transformation and peace development, and their application in development cooperation.

20 These include conflict analysis, conflict-related impact monitoring, advisory guidelines (for conflict monitoring) and, as a pivotal and well-established instrument of conflict mainstreaming, the assignment of C (Conflict) markers in project/programme appraisals.

### 5.3 Challenges for development cooperation: Climate policy

stantive and strategic support to the relevant environmental divisions of development institutions. A conflict screening of climate change mitigation and adaptation strategies and measures, with time horizons of several years or decades, places particularly high demands upon such strategies. And, finally, all climate-related adaptation strategies now planned or already initiated should, in turn, be reviewed as to their potential conflict impacts, and conflict-sensitive indicators need to be integrated within ongoing monitoring activities.

**Integrating knowledge and competence in development cooperation:** To carry out such cross-cutting activities, it is essential that the various sector projects and programmes with their diverse expertise cooperate. Furthermore, there is a need to build appropriate capacities in the other implementing organisations of development cooperation, too. This is primarily a matter of the joint development of impact assessment methods and their concrete (pilot) application (sectoral or regional).

**Knowledge transfer in partner institutions:** Efforts must be made to ensure the transfer or further development of knowledge on this topic for country offices and regional offices located in the states and regions identified. BMZ's "Programme of Action on Climate and Development" already envisions further expansion of the Civil Peace Service in countries with a particular climate-induced propensity for crisis (BMZ 2007b). The experience gathered here can be utilised at a later time for knowledge- and competence-building measures within development institutions. This applies similarly to the expansion and strengthening of local capacities for the analysis and identification of potential climate-related conflicts.

**International donor coordination:** Numerous national and multilateral donor institutions have produced status reports and strategies addressing the question of which role they could play with their various instruments and programmes. Bodies such as the OECD DAC would be suitable coordination hubs. Synergies are conceivable and purposeful, especially when producing a comprehensive database and conducting the complex regional and country analyses. However, since the greater part of the planned comprehensive analyses is conducted by civil services or military institutions, development cooperation institutions will need to develop in parallel methods and analyses tailored to their specific needs.

The findings of the IPCC and Stern reports illustrate impressively that climate policy must become a pillar of international policy and that far-reaching emissions reduction measures are needed if the development progress achieved is not to be jeopardised. The WBGU report additionally underscores the function of climate policy as prevention policy, a perspective already lent support to BMZ's "Programme of Action on Climate and Development" (2007b). This has given greater weight to calls for a swift and radical change in global climate policy in order to contain social and political disruption worldwide and prevent climate change from finally becoming an issue of international security. In addition to the political priority of a comprehensive transformation of energy systems towards sustainability – a further leitmotif of German development cooperation – the conflict-relevant trends identified in the reports also highlight possible regional priorities in the sphere of adaptation. Questions of disaster prevention, in particular, will play an increasingly important role in this regard. This also means that adaptation needs to be viewed not only as a technical and financial challenge for development cooperation, but also as a political corridor for action.

In this setting, the following development cooperation approaches appear expedient:

**Mainstreaming climate protection:** The added relevance of climate policy as prevention policy indicates that German development cooperation projects and programmes, especially those in the regional hotspots identified, need to be assessed systematically in terms of their climate sensitivity ("climate check"). In this way, in countries where climate change leads to a high risk of escalating conflicts climate protection can be mainstreamed in development cooperation as a cross-cutting theme, contributing through foresight to preventing conflict. WBGU proposes at superordinate level that climate protection aspects be taken up in Poverty Reduction Strategy Papers. This applies equally to other planning processes and strategies, such as national environmental action programmes.

**Conflict-sensitive emissions reduction:** On the mitigation side, the conservation of natural carbon sinks has substantial conflict relevance. Forest conservation is often a profitable climate change mitigation measure, and can additionally help to curb further resource conflicts (illegal logging). A further approach is to foster sustainable energy systems: This not only

## 5.4 Challenges for development cooperation: Disaster Risk Management

helps to end energy poverty, but can also, in view of mounting competition over fossil energy resources, have a preventive effect over the long term beyond climate protection and can counteract the potentially destabilising effect of mounting resource competition. The development and conservation of natural carbon sinks must not, however, occur at the expense of other sustainability dimensions, nor should it trigger new conflict constellations, for instance as a result of intensified use of bioenergy and hydropower or through activities that rob local groups of their livelihoods. A peace and conflict assessment can be helpful to avoid adverse effects (see above).

### **Strategic prioritisation and expansion of adaptation measures:**

Thus, while German development cooperation does not need a fundamentally new climate policy on the mitigation side, changes to regional priorities on the adaptation side are conceivable. There is a fundamental need for action to expand and strengthen local and regional capacities to analyse and manage the impacts of climate change. This process is already being initiated within the context of adaptation activities under the UNFCCC and the Kyoto Protocol, but needs to be intensified through other, complementary activities. Here German development cooperation can act more rapidly than the UNFCCC process, which has been cumbersome to date; this is exemplified not least by the support provided by GTZ for the preparation of a national adaptation strategy in Tunisia. It can set also regional priorities and – working on the basis of the conflict-related country analyses (see above) supported by the Crisis Prevention Programme – can engage in a strategic prioritisation or inclusion of additional priorities in the sphere of adaptation, in order to systematically give a boost to the essential capacities in fragile states (and in neighbouring, and thus in the future potentially fragile, states). Such an approach also means that the development of adaptation strategies is perceived increasingly as a political approach above and beyond the previous technical approach.

**Financing additional activities:** The need to expand adaptation activities is not new to German development cooperation. The potentially preventive relevance of adaptation measures set out above does, however, underscore that this approach needs expanding and that the appropriate human and financial resources must be provided.

Climate change diminishes the resilience of societies when faced with natural and technological disasters, and increases the likelihood that extreme events, such as droughts and hurricanes, exert a destabilising effect. In combination with other global trends, the vulnerability of developing countries will rise, with the result that, in extreme cases, violent conflicts can be triggered and the dissolution of fragile states set in train. In many instances disasters are not only national but indeed international in character, as they interrupt economic cycles and trigger refugee movements. The increased vulnerability of cities, especially in coastal areas, presents an additional challenge.

In this setting, the following development cooperation approaches appear expedient:

### **Integrating instruments and experience in disaster risk management:**

Extreme natural events, which also include those induced climatically, can trigger natural disasters. This is why the German Federal Foreign Office and BMZ already support disaster risk management (DRM) as a cross-cutting issue in high-risk countries. Climate change will cause the number of these countries and regions at risk to grow. Disaster prevention and preparedness for extreme natural events are thus moving ever more to the fore (cf. GFDRR 2006, 2007). Thanks to their many years of experience in comprehensive DRM, GTZ and other organisations (German Agro Action – DWHH, Red Cross, and others) command an array of tried and proven instruments (see e.g. GTZ 2004, 2004a). The prime concern here is to reduce the vulnerability of affected societies – their populations, infrastructure, cities and economies – to natural hazards. Approaches and instruments already in use include security analysis and risk assessment, early warning, capacity development and institutional development. Acting in concert with GTZ's three sector programmes – the Climate Protection Programme, the Crisis Prevention Programme and the Disaster Risk Management Programme – these instruments can be refined and systematically integrated in order to harness the evident synergies (cf. GTZ 2005; BMZ 2007).

**Developing and systematically deploying security analysis and risk assessment:** One useful approach is to conduct systematic security analyses and risk assessments in the preparatory phase of projects and in affected countries; these should

## 5.5 Long term challenges for development policy and cooperation

also examine the possible impact of climate change on development cooperation activities themselves. In the ideal case, projects and programmes could already be designed in a risk-sensitive and disaster-preventive manner in the planning phase. Security analyses and risk assessments and the adaptation strategies building upon them should inform national development strategies (such as poverty reduction strategies). They should also identify ways to reduce the vulnerability of particular hotspots in a targeted manner.

**Pilot studies for country security analysis and risk assessment:** In a process involving close coordination with the pilot studies on issues of crisis prevention security analyses and risk assessments of countries presently already particularly at risk should be conducted. These analyses will need to adopt a long-term perspective in order to be able to identify key fields of DRM action long before the possible occurrence of climate-induced extreme events, and to design appropriate (pilot) projects and programmes (especially with regard to sea-level rise). The countries noted in the present report can serve as a starting point for the selection of climate-sensitive and disaster-sensitive countries.

**Information platform for knowledge accumulation:** Due to the complexity of the biogeophysical changes triggered by climate change, it is important to assemble and process information in a format that allows the performance of security analyses and risk assessments as well as risk monitoring at country and project level. This platform could serve in addition as a database containing examples of best practice and lessons learnt emerging from the country offices and could thus contribute to knowledge transfer. In the long run, it would be essential to network the platform by opening it to partner countries and members of the donor community in order to provide for coherence of climate-related risk data collection and evaluation. Such a platform could usefully complement schemes updated on a daily basis, such as the Humanitarian Early Warning Service (HEWS) maintained by the World Food Programme, supplementing them with the long-term perspective.

The relevance of climate change for various sectors of development cooperation will grow further as a result of the predicted impacts and potential security policy implications. In the fields of energy supply or urbanisation, for instance, this applies equally to the dimension of the generators of climate change and to the dimension of those affected by it. Water availability and food shortages are threatening to become no longer “only” a problem of human security, but rather one of national or international security. A further point is that mass migration can impact upon cooperation with partner countries in the most varied fields. In all fields, governance issues are pivotal, whereby account needs to be taken of both the institutional and the political dimension of governance.

The following approaches appear suited to strengthen the preventive potential and cross-cutting character of climate protection policy:

**Adjusting priorities.** A first step is to assess development cooperation projects and programmes systematically as to their climate sensitivity or problem-solving potential. Water, rural development, energy and urban development are priority sectors indicated by the WBGU report and by the analysis in Chapters 2 and 3 of the present report.

**Intensifying transboundary cooperation.** Transboundary water cooperation is an established instrument of peaceful and fair reconciliation of interests that can contribute to regional integration and stability. GTZ can intensify projects and programmes already under way in this field, and, building upon country analyses, can extend them to further areas potentially at risk. River basins and groundwater reservoirs should be included in such activities in the mid-term alongside jointly used rivers and lakes.

**Improving governance through capacity development.** A loss of legitimacy and of capacity to act can lead to political destabilisation and ultimately to the eruption of violent conflict. Activities designed to strengthen governance capacity in the environmental sphere and beyond can raise awareness of

climate change among decision-makers and in society at large. Heightened awareness of the challenges can help to increase participation in problem-solving. This approach can stem the loss of governance capacity, by ensuring that adaptation to climate change is understood as a societal project and by preparing and qualifying the relevant organisations for their governance tasks in this connection. The BMZ strategy for Development-Oriented Transformation in Conditions of Fragile Statehood and Poor Government Performance (BMZ 2007) provides important starting points for such an approach. It needs to be supplemented to embrace questions of climate change and adaptation as the case arises.

**New responses to new challenges.** Migration presents a new challenge as a potential driver of conflict. Its scope and causation will require a reappraisal of past development cooperation approaches. In the extreme case, it may become necessary to support the search for alternative settlement areas in the

sense of proactive migration management; such a situation may arise if it becomes clear that no climate-independent, income-generating alternatives exist in a rural area. Moreover, the present report has repeatedly underscored the growing relevance of cities. Here it will not suffice to support comprehensive protective measures for urban infrastructure – which can, in fact, further amplify disaster risks if it leads to a further increase of urban density guided by a misplaced sense of safety. Approaches towards anticipatory urban planning must take account of the major present and future social and economic dynamics. This is likely to prompt a need to form new knowledge networks in certain spheres, for instance the potential health impacts of climate change in cities (spread of pathogens, heat waves, water shortages). A stock-taking exercise conducted within the context of a conference on “Cities in a Changing Climate” would be a possible starting point.



## 6. Selected literature

ASEAN 2007: Cebu Declaration on East Asian Energy Security. Cebu, Philippines, 15 January 2007. Available at: <http://www.aseansec.org/19319.htm> (24 August 2007).

AU 2007: Assembly of the African Union. Eighth Ordinary Session. 29-30 January 2007. Decisions and Declarations. Available at <http://www.africa-union.org/root/AU/Conferences/Past/2007/January/summit/summit1.htm#> (24 August 2007).

AU Commission (not dated): The Green Wall for the Sahara Initiative. A Concept Note. Available at: <http://www.unep.org/roa/Amcen/Docs/africanunioncommision.pdf> (23 August 2007).

Böge, Volker 2007: Umwelt, Konflikt und Sicherheit. Ein Überblickpapier zum Stand der internationalen Diskussion im Themenfeld ‚Umwelt, Sicherheit und Entwicklung‘. Erstellt im Auftrag des GTZ-Projekts: „Krisenprävention und Konfliktbearbeitung in der Entwicklungszusammenarbeit“, Stand 21. Februar 2007. Duisburg: Institut für Entwicklung und Frieden.

Barqueiro, Carla 2006: Human Security: An Examination of Urban Violent Crime in Rio de Janeiro and São Paulo. Available at: [http://humansecurity-cities.org/sites/hscities/files/Barqueiro\\_C\\_Violent\\_Crime\\_in\\_Rio\\_de\\_Janeiro\\_and\\_Sao\\_Paulo.pdf](http://humansecurity-cities.org/sites/hscities/files/Barqueiro_C_Violent_Crime_in_Rio_de_Janeiro_and_Sao_Paulo.pdf) (24 August 2007).

Borthelmy, Lamba 2005: Conservation et Valorisation des eaux et des terres de forêt de Gbazabangui. Available at [http://www.britishecologicalsociety.org/articles/grants/reports/OB228\\_246](http://www.britishecologicalsociety.org/articles/grants/reports/OB228_246) (30 August 2007)

Brauch, Hans Günter 2006: Regionalexpertise – Destabilisierungs- und Konfliktpotential prognostizierter Umweltveränderungen in der Region Südeuropa und Nordafrika bis 2020/2050. Expertise for the WBGU Report: “World in Transition: Climate Change as a Security Risk”. Available at [http://www.wbgu.de/wbgu\\_jg2007\\_ex01.pdf](http://www.wbgu.de/wbgu_jg2007_ex01.pdf) (3 August 2007).

Brown, Lester R. 2005: Plan B: Rescuing a Planet under Stress and a Civilization in Trouble. Washington, D.C.: W. W. Norton.

BMU (Ed.) 2002: Klima und Konflikt. Berlin: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit.

BMZ 2007: Development-Oriented Transformation in Conditions of Fragile Statehood and Poor Government Performance. BMZ Strategies 153. Bonn/Berlin: German Federal Ministry for Economic Cooperation and Development (BMZ).

BMZ 2007a: Länder und Regionen. Partnerländer. Available at <http://www.bmz.de/de/laender/partnerlaender/index.html> (27 August 2007).

BMZ 2007b: Klimakonzept konkret. Aktionsprogramm “Klima und Entwicklung”. Bonn/Berlin: Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung.

BMZ 2004: Katastrophenvorsorge in der Entwicklungszusammenarbeit. Bonn/Berlin: Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung.

Carius, Alexander 2007: Environmental Peacebuilding. Environmental Cooperation as an Instrument of Crisis Prevention and Peacebuilding: Conditions for Success and Constraints. Berlin: Adelphi Consult.

Carius, Alexander, Dennis Tänzler and Judith Winterstein 2006: Weltkarte von Umweltkonflikten – Ansätze zur Typologisierung. Expertise for the WBGU Report: “World in Transition: Climate Change as a Security Risk”. [http://www.wbgu.de/wbgu\\_jg2007\\_ex02.pdf](http://www.wbgu.de/wbgu_jg2007_ex02.pdf) (3 August 2007).

Carius, Alexander and Dennis Tänzler 2005: Wandelt Klima Sicherheit? – Eine Diskussion konfliktiver und konfliktpräventiver Aspekte internationaler Klimapolitik. In: Martin H. W. Möllers and Robert Chr. van Ooyen (eds.): Jahrbuch Öffentliche Sicherheit 2004/2005. Frankfurt a.M.: Verlag für Polizeiwissenschaft, pp. 515-530.

- Clark, William A.V. 2007: Environmentally Induced Migration and Conflict. Expertise for the WBGU report “World in Transition: Climate Change as a Security Risk”. Available at [http://www.wbgu.de/wbgu\\_jg2007\\_ex04.pdf](http://www.wbgu.de/wbgu_jg2007_ex04.pdf) (3 August 2007).
- Coemenetz, Joshua and César Caviedes 2002: Climate variability, political crisis and historical population displacement in Ethiopia. In: *Environmental Hazards* 4 (2002), pp. 113-127.
- CNA 2007: National Security and the Threat of Climate Change. Available at <http://securityandclimate.cna.org/> (30 July 2007).
- Davis, Tom 2006: A Failure of Initiative. Final Report of the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina. Available at <http://www.katrina.house.gov/index.htm> (10 October 2007).
- Diamond, Jared 2005: *Collapse. How Societies Choose to Fail or Succeed*. London: Penguin Books.
- Dückers, Daniel 2007: Konflikt- und Krisenpotenziale in Kooperationsländern der EZ 2007. Stand: 02. Februar 2007. Hamburg: German Institute of Global and Areas Studies.
- Goedeking, Ulrich and Moira Zuzao 2006: *Studien zur länderbezogenen Konfliktanalyse: Bolivien*. Berlin: Friedrich Ebert Stiftung.
- EU 2007: Brussels European Council 21/22 June 2007. Presidency Conclusions. Brussels: Council of the European Union.
- Flintan, Fiona and Imeru Tamrat 2002: Spilling Blood over Water? The Case of Ethiopia. In: Jeremy Lind and Kathryn Sturman (eds.) 2002: *Scarcity and Surfeit. The Ecology of Africa's Conflicts*. Pretoria: Institute for Security Studies, pp. 243-319.
- Freistein, Katja 2006: Die Praxis des „ASEAN Way“. Über den Umgang mit zwischenstaatlichen Konflikten in Südostasien. HSFK Report 4/2006. Frankfurt am Main: Hessische Stiftung Friedens- und Konfliktforschung.
- Fund for Peace 2007: Failed State Index 2007. Available at [http://www.fundforpeace.org/web/index.php?option=com\\_content&task=view&id=229&Itemid=366](http://www.fundforpeace.org/web/index.php?option=com_content&task=view&id=229&Itemid=366) (30 August 2007).
- GFDRR 2007: Committed to Reducing Vulnerabilities to Hazards by Mainstreaming Disaster Reduction and Recovery in Development. Available at <http://www.unisdr.org/eng/partner-netw/wb-isdr/Global-Facility-for-DR-and-Recovery-2007.pdf> (17 March 2008).
- GFDRR 2006: A partnership for mainstreaming disaster mitigation in poverty reduction strategies. Available at <http://unisdr.org/eng/partner-netw/wb-isdr/wb-isdr-GFDRR.pdf> (17 March 2008).
- GTZ 2005: *Linking Poverty Reduction and Disaster Risk Management*. Eschborn: GTZ.
- GTZ 2004: *Risk Analysis – a Basis for Disaster Risk Management*. Eschborn: GTZ.
- GTZ 2004a: *Disaster Risk Management in rural areas of Latin America and the Caribbean. Selected Instruments*.
- HIIK 2007: Conflict Barometer 2006. Available at [http://www.hiik.de/konfliktbarometer/pdf/ConflictBarometer\\_2006.pdf](http://www.hiik.de/konfliktbarometer/pdf/ConflictBarometer_2006.pdf) (21 August 2007).
- Homer-Dixon, Thomas. F. (1999): *Environment, Scarcity, and Violence*. Princeton: Princeton University Press.
- Houdret, Annabelle and Dennis Tänzler 2006: Umweltwandel und Konflikte. In: Debiel, Tobias / Messner, Dirk / Nuscheler, Franz (eds.), *Globale Trends 2007. Frieden, Entwicklung, Umwelt*: Frankfurt/M.: Fischer Taschenbuch Verlag, 359-376.
- Hünemeyer, Anne 2007: Klimawandel: Auswirkungen und Konfliktpotenziale. Available at [http://www.kfw-entwicklungsbank.de/DE\\_Home/Service/Online\\_Bibliothek/PDF-Dokumente\\_Volkswirtschaftliche\\_Analysen/WLP-2007-06\\_Klima\\_und\\_Konflikte\\_Juni\\_19.pdf](http://www.kfw-entwicklungsbank.de/DE_Home/Service/Online_Bibliothek/PDF-Dokumente_Volkswirtschaftliche_Analysen/WLP-2007-06_Klima_und_Konflikte_Juni_19.pdf) (21 September 2007).
- Hyde Hecker, Jeanna 2005: Promoting Environmental Security and Poverty Alleviation in the Matavén area of Colombia. Available at [http://www.envirosecurity.org/espa/PDF/IES\\_ESA\\_CS\\_Mataven\\_Case\\_Study.pdf](http://www.envirosecurity.org/espa/PDF/IES_ESA_CS_Mataven_Case_Study.pdf) (23 August 2007).

- ICG 2007: Côte d'Ivoire. Can The Ouagadougou Agreement Bring Peace? Africa Report N°127. Brussels: International Crisis Group.
- ICG 2007a: Nigeria: Failed Elections, Failed State? Africa Report N°126. Brussels: International Crisis Group.
- ICG 2007b: Elections, Democracy and Stability in Pakistan. Asia Report N°137. Brussels: International Crisis Group.
- ICG 2007c: Colombia's New Armed Groups. Latin America Report N°20. Brussels: International Crisis Group.
- ICG 2006: Pakistan: The Worsening Conflict in Balochistan. Asia Report N°119. Brussels: International Crisis Group.
- IEA 2005: World Energy Outlook 2005. Available at <http://www.iea.org/textbase/nppdf/free/2005/weo2005.pdf> (23 August 2007).
- ILO 2007: African Employment Trends. April 2007. Available at: <http://www.ilo.org/public/english/employment/strat/download/getaf07.pdf> (23 August 2007).
- IPCC 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- IPCC 2007a: Climate change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer (eds.)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- IPCC 2007b: Climate Change 2007: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. Summary for Policymakers. Available at <http://www.ipcc.ch/SPM13apr07.pdf> (30 July 2007).
- Karachi District Government 2007: Geography & Demography. Available at: <http://125.209.91.254/cdgk/Home/AboutKarachi/GeographyDemography/tabid/270/Default.aspx> (24 August 2007).
- Karachi District Government 2007a: Economy and Development. Available at: <http://www.karachicity.gov.pk/> (24 August 2007).
- Krium 2007: Newsletter Special Issue "Gender, Umwelt, Konflikt", Available at <http://www.krium.de/upload/Newsletter/Gender07.pdf> (30 August 2007).
- Loneragan, Steve 1999: Global Environmental Change and Human Security. Science Plan. Bonn: International Human Dimensions Programme on Global Environmental Change.
- Leander, Anna 2004: Wars and the un-making of states: taking Tilly seriously in the contemporary world. In: Stefano Guzzini and Dietrich Jung (eds.) 2004: Contemporary Security Analysis and Copenhagen Peace Research. London: Routledge, pp. 69 – 80
- Maihold, Günther and Jörg Husar 2005: Demokratiekrisen in Lateinamerika. Bolivien und Venezuela als Testfälle für das demokratische Engagement der internationalen Gemeinschaft. SWP-Aktuell Juni 2005. Berlin: Stiftung Wissenschaft und Politik.
- Martin, Adrian 2005: Environmental Conflict Between Refugee and Host Communities. Journal of Peace Research, Vol. 42, No. 3, pp. 329-346.
- Mason, Simon 2004: From Conflict to Cooperation in the Nile Basin. Zürich: ETH Zürich.
- Millennium Ecosystem Assessment 2005: Millennium Ecosystem Assessment 2005. Ecosystems and Human Well-Being: Synthesis Report. Washington, DC: Island Press.

- Morton, Andrew 2007: Sudan: UNEP über vergangene und zukünftige Trends. Available at [http://www.krium.de/front\\_content.php?idart=538](http://www.krium.de/front_content.php?idart=538) (30 August 2007).
- OAS 2007: Report on measures and actions related to implementation of the declaration on security in the Americas (presented by the Secretariat for Political Affairs of the OAS). Washington: Organisation of American States.
- OAS 2007a: Report on measures and actions related to implementation of the declaration on security in the Americas (presented by the Inter-American Defense Board of the OAS). Washington: Organisation of American States.
- OAS 2007b: Draft Resolution on the Follow-Up of the Special Conference on Security (presented by the delegation of Mexico and approved at the meeting of 11 May 2007). Washington: OAS.
- OAS 2003: Declaration on Security in the Americas. Adopted at the third plenary session 28 October, 2003. Washington: Organisation of American States.
- Oxfam 2005: „Klimawandel und Konflikt im Nordwesten Kenias“ In: KRIUM – Zivile Krisenprävention: Umwelt und Ressourcen, 06/2005. Available in English at [http://www.oxfam.org.uk/resources/policy/climate\\_change/downloads/climatechange\\_oxfam\\_stern.pdf](http://www.oxfam.org.uk/resources/policy/climate_change/downloads/climatechange_oxfam_stern.pdf).
- Petz, Peter 2007: Innere Sicherheit in Lateinamerika – Probleme und Perspektiven. In: GIGA-Focus No. 7. Hamburg: German Institute for Global and Area Studies.
- Petersen, Lorenz and Matthias von Bechtolsheim 2007: Anpassung an den Klimawandel: Antworten der deutschen Entwicklungszusammenarbeit. In: *Entwicklung & ländlicher Raum*, Ausgabe 05/2007.
- Rahmstorf, Stefan 2007: A Semi-Empirical Approach to Projecting Sea-Level Rise. In: *Science* Vol. 315, 368-370.
- Romer, Kate 2006: “Environmental” refugees? In: *Forced Migration Review*, Issue 25, 61 (May 2006).
- Salehyan, Idean 2005: Refugees, Climate Change, and Instability. International Workshop “Human Security and Climate Change”, 21-23 June 2005 in Oslo. Available at [http://www.cicero.uio.no/humsec/list\\_participants.html](http://www.cicero.uio.no/humsec/list_participants.html) (15 August 2007).
- Salehyan, Idean and Kristian Gleditsch 2004: Refugee Flows and the Spread of Civil War. Manuscript. San Diego: Department of Political Science, University of California.
- Schellnhuber, Hans Joachim (ed.) 2006: *Avoiding dangerous climate change*. Cambridge: Cambridge University Press.
- Schneckener, Ulrich 2007: Rankings und Indizes: Welche Staaten gelten als fragil? Available at [http://www.swp-berlin.org/de/common/get\\_document.php?asset\\_id=3832](http://www.swp-berlin.org/de/common/get_document.php?asset_id=3832) (29 August 2007).
- Schneckener, Ulrich 2006: *Transnationaler Terrorismus*. Frankfurt am Main: Suhrkamp.
- Schneckener, Ulrich (ed.) 2004: *States at Risk. Fragile Staatlichkeit als Sicherheits- und Entwicklungsproblem*. Berlin: Stiftung Wissenschaft und Politik.
- Schroeder-Wildberg, Esther and Alexander Carius 2004: *Illegal Logging, Conflict and the Business Sector in Indonesia*. Berlin: InWent.
- Simms, Andrew and Hannah Reid 2006: *Up in Smoke? Latin America and the Caribbean. The threat from climate change to the environment and human development*. Available at: <http://www.foe.co.uk/resource/reports/upinsmokelatamerica.pdf> (24 August 2007).
- SOPAC 2004: *EVI Country Profiles*. Available at [http://www.vulnerabilityindex.net/EVI\\_Country\\_Profiles.htm](http://www.vulnerabilityindex.net/EVI_Country_Profiles.htm) (30 August 2007).
- Spector, Bertram I. and Amanda Wolf 2000: *Negotiating Security: New Goals, Changed Process*. *International Negotiation*, Vol. 5, pp. 411-426.

Stern, Nicolas 2006: The Economics of Climate Change. The Stern Review. [http://www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/stern\\_review\\_report.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm) (30 July 2007).

Swearingen, Will 1990: Algeria's Food Security Crisis. In: Middle East Report No.166, pp. 21-25.

Tänzler, Dennis, Boris Schinke and Christoph Bals 2006: Is there "Climate Security" for India? "Tipping Points" as Drivers of Future Environmental Conflicts. Background paper prepared for the workshop „Klimawandel und Sicherheit – Fallbeispiel Indien“, December 2006, Potsdam Institute for Climate Impact Research.

Tetzlaff, Rainer and Cord Jakobeit 2005: Das nachkoloniale Afrika. Politik – Wirtschaft – Gesellschaft. Wiesbaden: VS Verlag.

UN 2004: World Population to 2300. Available at <http://www.un.org/esa/population/publications/longrange2/WorldPop-2300final.pdf> (23 August 2007).

UNDP 2006: Human Development Report 2006. Beyond scarcity: Power, poverty and the global water crisis. New York: UNDP.

UNDP 2006a: The Arab Human Development Report 2005. Towards the Rise of Women in the Arab World. New York: UNDP.

UNEP 2007: Sudan: Post-Conflict Environmental Assessment. Available at <http://www.unep.org/sudan/> (31 August 2007).

UNFPA (United Nations Population Fund) 2007: State of World Population 2007. Unleashing the Potential of Urban Growth. UNFPA, New York.

UNODC 2007: Coca Cultivation in the Andean Region. A survey of Bolivia, Colombia, Ecuador and Peru. Available at [http://www.unodc.org/pdf/andean/Andean\\_report\\_2007.pdf](http://www.unodc.org/pdf/andean/Andean_report_2007.pdf) (23 August 2007).

UNPD 2006: World Population Prospects: The 2006 Revision Population Database. Available at <http://esa.un.org/unpp/> (23 August 2007).

UNSC 2007: 5663rd Meeting, Tuesday, 17 April, 10am. S/PV.5663. New York: UNSC.

UNSC 2007a: Security Council holds first-ever meeting on impact of climate on peace, security, hearing over 50 speakers. Available at <http://www.un.org/News/Press/docs/2007/sc9000.doc.htm> (30 July 2007).

UNHCR 2006: Statistical Yearbook 2005. Ethiopia. Available at <http://www.unhcr.org/cgi-bin/texis/vtx/statistics/opendoc.pdf> (22 August 2007).

UNSG 2007: Report of the Secretary-General on Chad and the Central African Republic, 23 February 2007. UN document S/2007/97. New York: UN.

UNSG 2007a: Report of the Secretary-General on the situation in the Central African Republic and the activities of the United Nations Peacebuilding Support Office in the Central African Republic, 22 June 2007. UN document S/2007/376. New York: UN.

UNESCO-WWAP 2003: World Water Development Report. Water for People, Water for Life. United Nations Educational, Scientific and Cultural Organization (UNESCO) and Berghahn Books.

UN Energy 2007: Sustainable Biofuels. A Framework for Decision-Makers. Available at: <http://esa.un.org/un-energy/pdf/susdev.Biofuels.FAO.pdf> (26 August 2007).

UN HABITAT 2003: The Challenge of Slums: Global Report on Human Settlements 2003. London and Sterling: Earthscan.

US Army 2003: Stability Operations and Support Operations. Available at <http://www.fas.org/irp/doddir/army/fm3-07.pdf> (23 August 2007).

WBGU 2007: Welt im Wandel: Sicherheitsrisiko Klimawandel. Working copy for submission to the Federal Government on 6 June 2007. Berlin: WBGU.

WFP 2007: Where we work – Ethiopia. Available at [http://www.wfp.org/country\\_brief/indexcountry.asp?country=231#](http://www.wfp.org/country_brief/indexcountry.asp?country=231#) (22 August 2007).

WMO 2006: Climate Information and Development Needs. An Action Plan for Africa. Available at: [http://www.wmo.ch/pages/prog/gcos/Publications/gcos-108%20\(ENGLISH\).pdf](http://www.wmo.ch/pages/prog/gcos/Publications/gcos-108%20(ENGLISH).pdf) (24 August 2007).

World Bank 2007: Making the Most of Scarcity. Accountability for Better Water Management in the Middle East and North Africa. Washington: World Bank.

World Bank 2007a: World Development Indicators. Available at <http://devdata.worldbank.org/external/CPProfile.asp?SelectedCountry=MNA&CCODE=MNA&CNAME=Middle+East+%26+North+Africa&PTYPE=CP>

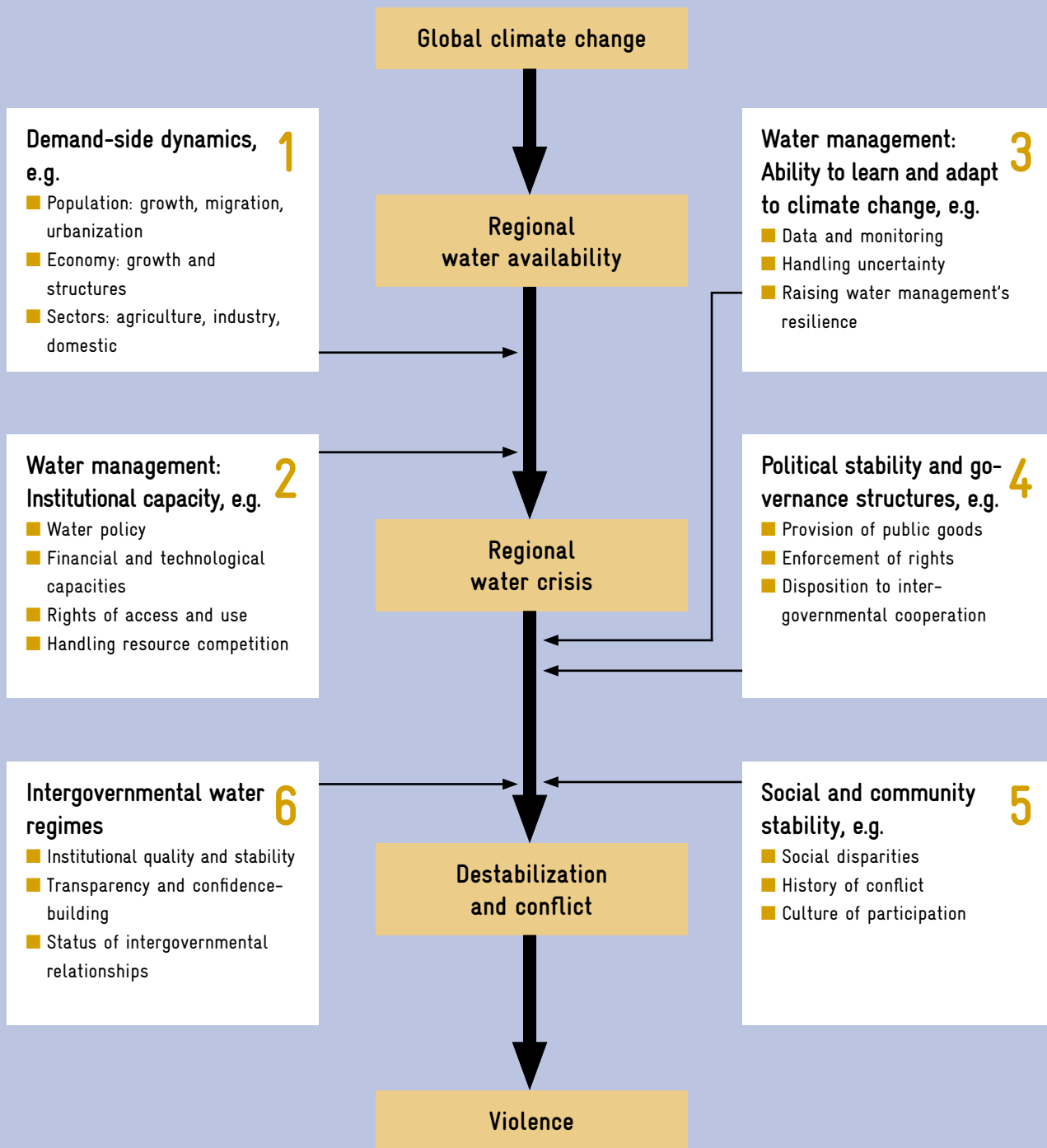
Wulf, Herbert 2006: Good Governance Beyond Borders: Creating a Multi-Level Public Monopoly of Legitimate Force. DCAF Occasional Papers No. 10. Geneva: Democratic Centre for the Control of the Armed Forces.

WWF, Oxfam, WaterAid.org 2006: Meeting Africa's Energy Needs. The Costs and Benefits of Hydropower. Available at <http://assets.panda.org/downloads/africahydropowerreport2006.pdf> (21 August 2007).

Zaluar, Alba 2004: Urban Violence and Drug Warfare in Brazil. In: Keen Koonings and Dirk Kruijt (eds.) 2004: Armed Actors. Organised Violence and State Failure in Latin America. London and New York: Zed Books, pp. 139-154.

# Annex: WBGU conflict constellations

WBGU Conflict constellation: Climate-induced degradation of freshwater resources

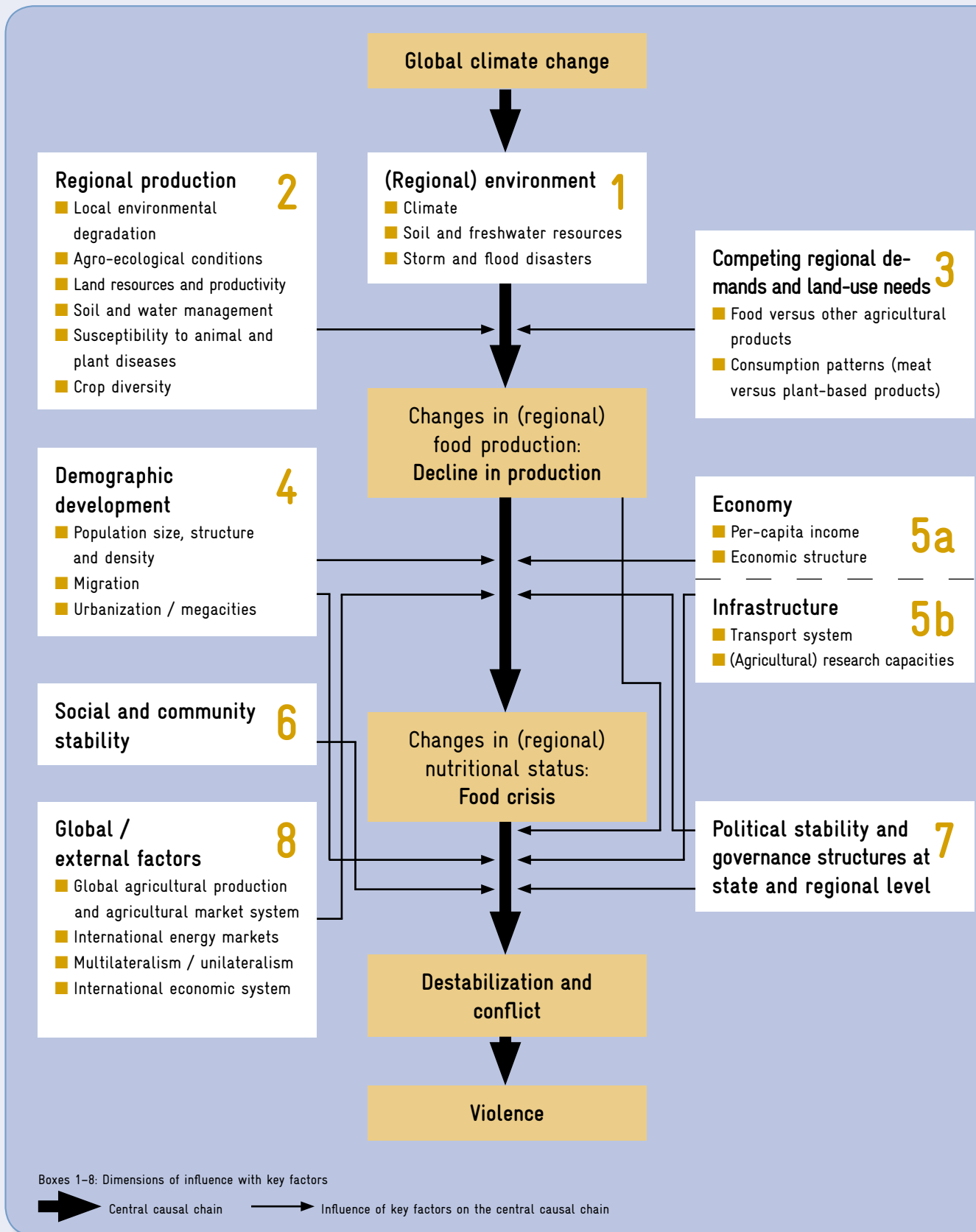


Boxes 1 - 6: Dimensions of influence with key factors

➔ Central causal chain      → Influence of key factors on the central causal chain

Source: WBGU 2007: 83

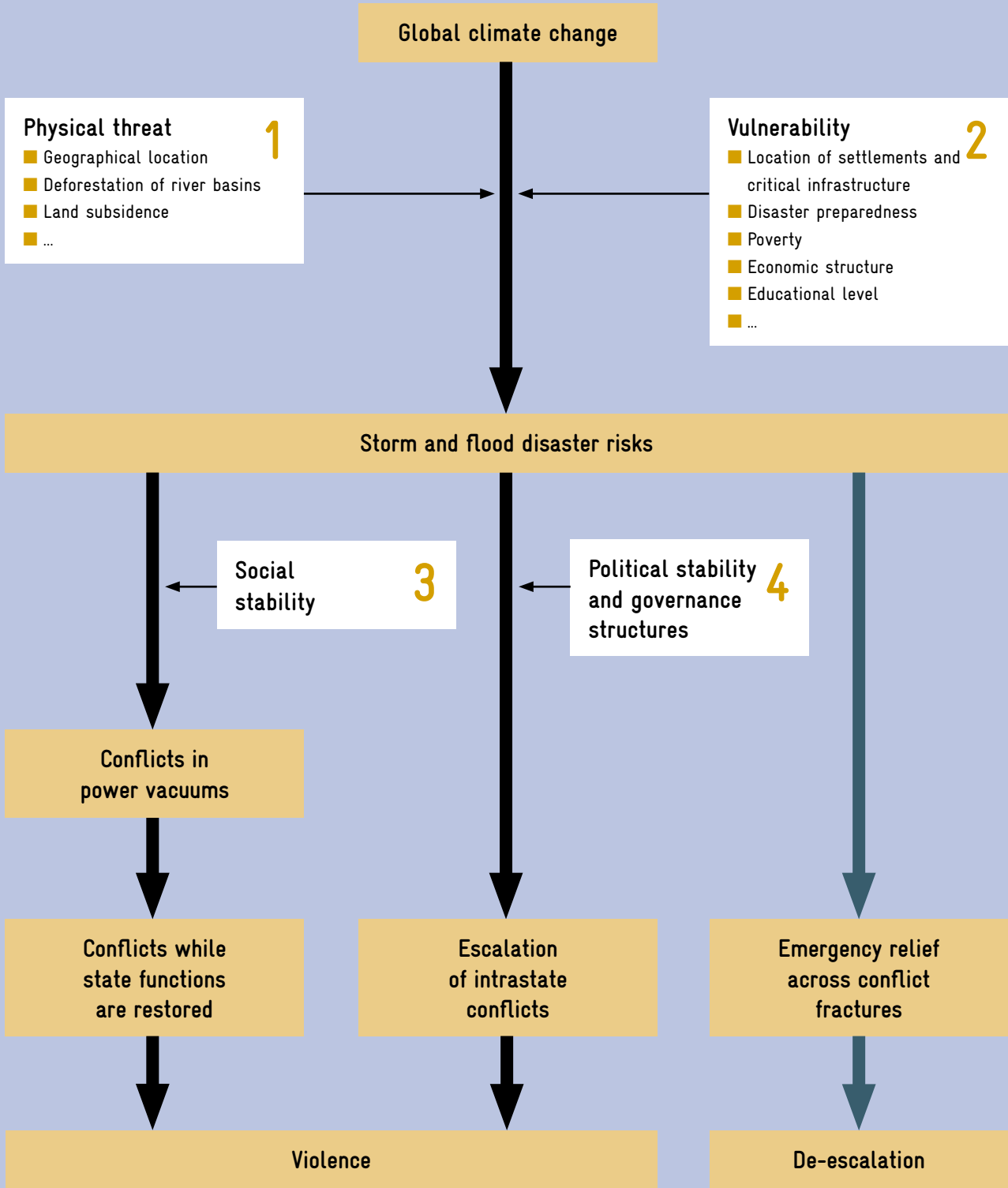
## WBGU Conflict constellation: Climate-induced decline in food production



Source: WBGU 2007: 103



WBGU Conflict constellation: Climate-induced increase in storm and flood disasters

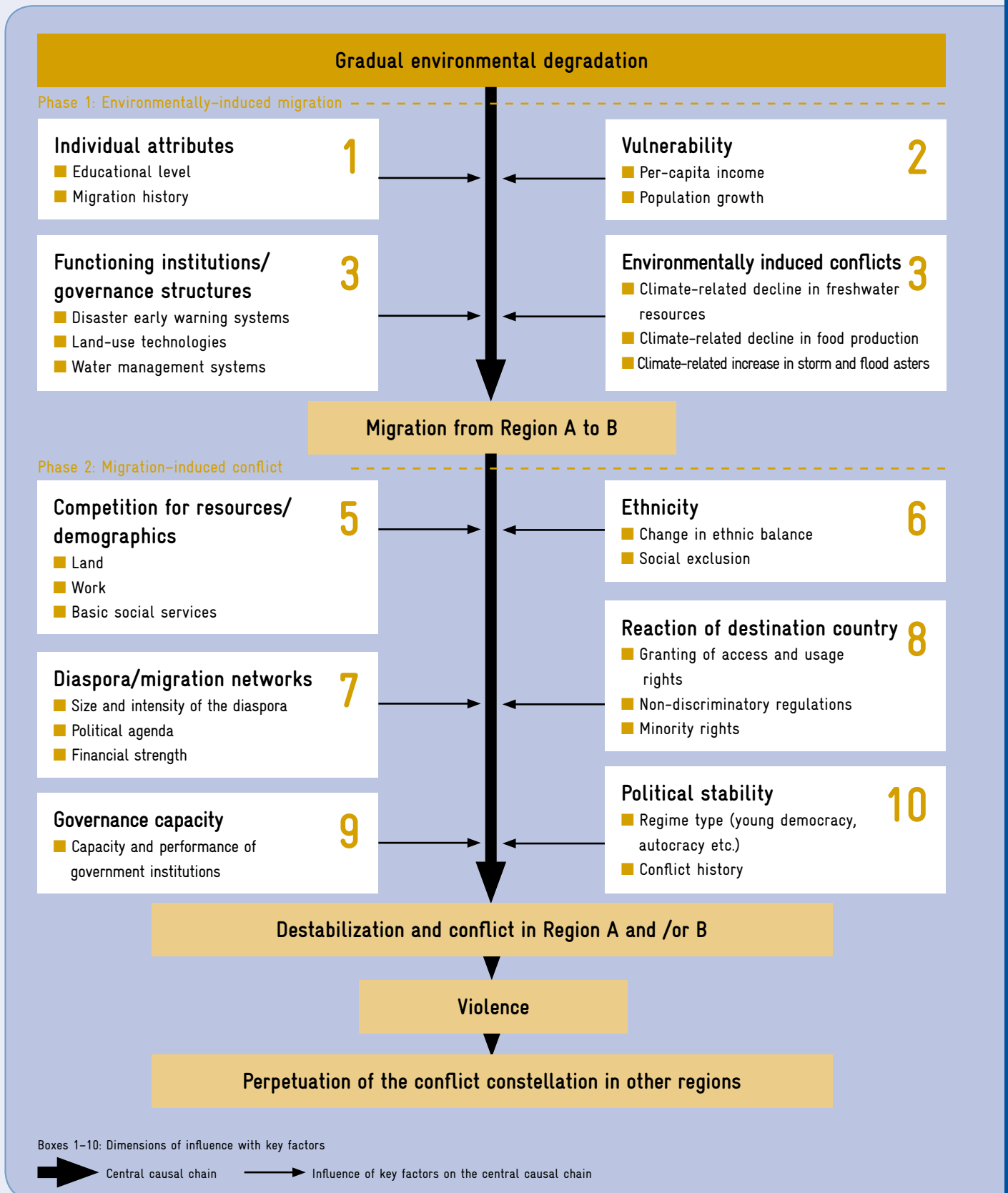


Boxes 1-4: Dimensions of influence with key factors

➡ Central causal chain      → Influence of key factors on the central causal chain

Source: WBGU 2007: 116

## WBGU Conflict constellation: Environmentally induced migration



Source: WBGU 2007: 128

## Acronyms and abbreviations

AU	African Union
BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit [Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany]
BMZ	Bundesministerium für Entwicklung und wirtschaftliche Zusammenarbeit [Federal Ministry for Economic Cooperation and Development, Germany]
CAR	Central African Republic
CNA	Centre for Naval Analyses
CPDC	Conflict, Peace and Development Cooperation Network
DAC	Development Assistance Committee
DC	Development Cooperation
DIE	Deutsches Entwicklungsinstitut [German Development Institute]
DRC	Democratic Republic of Congo
ECOSOC	UN Economic and Social Council
EU	European Union
EVI	Environmental Vulnerability Index
FfP	Fund for Peace
FSG	Fragile States Group
FSI	Failed State Index
GDP	Gross Domestic Product
GHG	Greenhouse gas(es)
GIGA	German Institute for Global and Area Studies
GTZ	Gesellschaft für technische Zusammenarbeit [German Technical Cooperation]
ICG	International Crisis Group
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
KRIUM	ECC-Platform Environment, Conflict and Cooperation
MDG	Millennium Development Goal
MEA	Millennium Ecosystem Assessment
MENA	Middle East and North Africa
NBI	Nile River Basin Initiative
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
OSCE	Organisation for Security and Co-operation in Europe
ppm	Parts per million
SOPAC	South Pacific Applied Geoscience Commission
UN	United Nations
UNDP	United Nations Development Programme
UNEO	United Nations Environment Organisation
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNPD	United Nations Population Division
USD	United States Dollar
WBGU	Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderung [German Advisory Council on Global Change]
WWF	Worldwide Fund for Nature

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