

World in Transition



German Advisory Council
on Global Change
(WBGU)

Climate Change as a Security Risk

Summary for
Policy-Makers



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World in Transition:

**Climate Change as a
Security Risk**

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Summary for policy-makers

A new security policy challenge

The core message of WBGU's risk analysis is that without resolute counteraction, climate change will overstretch many societies' adaptive capacities within the coming decades. This could result in destabilization and violence, jeopardizing national and international security to a new degree. However, climate change could also unite the international community, provided that it recognizes climate change as a threat to humankind and soon sets the course for the avoidance of dangerous anthropogenic climate change by adopting a dynamic and globally coordinated climate policy. If it fails to do so, climate change will draw ever-deeper lines of division and conflict in international relations, triggering numerous conflicts between and within countries over the distribution of resources, especially water and land, over the management of migration, or over compensation payments between the countries mainly responsible for climate change and those countries most affected by its destructive effects.

In order to avoid these developments, an ambitious global climate policy must be put into operation over the next 10-15 years. An effective international climate protection regime must ensure that global greenhouse gas emissions are halved by the mid 21st century. This major international policy challenge arises in parallel to a far-reaching shift in the centres of power of the political world order, which will be dominated by the ascendancy of new powers such as China and India and the United States' simultaneous relative loss of power. The lessons of history suggest that this transition will be accompanied by turbulence in the international system which may make it more difficult to achieve the necessary breakthroughs in multilateral climate policy. In order to provide a counterbalance, the European Union must take a leading role in global climate policy and convince both the USA and the newly ascendant Asian powers of the importance of concerted efforts to avoid dangerous climate change.

That is the backdrop against which WBGU, in this flagship report, summarizes the state-of-the-art of

science on the subject of "Climate Change as a Security Risk". It is based on the findings of research into environmental conflicts, the causes of war, and of climate impact research. It appraises past experience but also ventures to cast a glance far into the future in order to assess the likely impacts of climate change on societies, nation-states, regions and the international system.

Climate change is only just beginning, but its impacts will steadily intensify in the coming decades. WBGU shows that *firstly*, climate change could exacerbate existing environmental crises such as drought, water scarcity and soil degradation, intensify land-use conflicts and trigger further environmentally-induced migration. Rising global temperatures will jeopardize the bases of many people's livelihoods, especially in the developing regions, increase vulnerability to poverty and social deprivation, and thus put human security at risk. Particularly in weak and fragile states with poorly performing institutions and systems of government, climate change is also likely to overwhelm local capacities to adapt to changing environmental conditions and will thus reinforce the trend towards general instability that already exists in many societies and regions (Box 1). In general it can be said that the greater the warming, the greater the security risks to be anticipated.

Secondly, new conflict constellations are likely to occur. Sea-level rise and storm and flood disasters could in future threaten cities and industrial regions along the coasts of China, India and the USA. The melting of the glaciers would jeopardize water supply in the Andean and Himalayan regions.

Thirdly, unabated climate change could cause large-scale changes in the Earth System such as the dieback of the Amazon rainforest or the loss of the Asian monsoon, which could have incalculable consequences for the societies concerned.

Overall, WBGU considers that climate-induced inter-state wars are unlikely to occur. However, climate change could well trigger national and international distributional conflicts and intensify problems already hard to manage such as state failure, the erosion of social order, and rising violence. In the worst-

Box 1**Climate change amplifies mechanisms which lead to insecurity and violence****POLITICAL INSTABILITY AND CONFLICTS**

Societies in transition from authoritarian to democratic systems are especially vulnerable to crises and conflicts. Climate change will affect many of these countries, putting them under additional pressure to adapt their societies during such phases of transition. This linkage could be significant for many African countries, for example, as well as for China.

WEAK GOVERNANCE STRUCTURES AND CONFLICTS

Violent conflicts are a very frequent feature of weak and fragile states, of which there are currently about 30, and which are characterized by the permanent weakening or even the dissolution of their state structures. The impacts of climate change will particularly affect those regions of the world in which states with weak steering and problem-solving capacities already predominate. Climate change could thus lead to the further proliferation of weak and fragile statehood and increase the probability of violent conflicts occurring.

ECONOMIC PERFORMANCE AND TENDENCY TO VIOLENCE

Empirical studies show that poor countries are far more prone to conflict than affluent societies. Climate change will result in tangible economic costs for developing countries in particular: a drop in agricultural yields, extreme weather events and migratory movements can all impede economic development. Climate change can thus reinforce obstacles to development and heighten poverty, thereby increasing the risk of conflicts occurring in these societies.

DEMOGRAPHICS AND CONFLICT

Wherever high population growth and density, resource scarcity (farmland, water) and a low level of economic development occur in tandem, there is an increased risk of conflict. In many countries and regions which are already affected by high population growth and density as well as poverty, climate change will exacerbate resource scarcity and thus heighten the risk of conflict.

SPILLOVER RISK IN CONFLICT REGIONS

Conflicts which are initially limited to local or national level often destabilize neighbour countries, e.g. through refugee flows, arms trafficking or combatant withdrawal. Conflicts thus have a spillover effect. The social impacts of climate change can transcend borders, thereby swiftly expanding the geographical extent of crisis and conflict regions.

affected regions, this could lead to the proliferation of destabilization processes with diffuse conflict structures. These dynamics threaten to overstretch the established global governance system, thus jeopardizing international stability and security.

Climate change as a threat to international security**Climate-induced conflict constellations**

WBGU identifies four conflict constellations in which critical developments can be anticipated as a result of climate change and which may occur with similar characteristics in different regions of the world. "Conflict constellations" are defined as typical causal linkages at the interface of environment and society, whose dynamic can lead to social destabilization and, in the end, to violence.

- *Conflict constellation "Climate-induced degradation of freshwater resources"*: 1.1 billion people are currently without access to safe drinking water. The situation could worsen for hundreds of millions of people as climate change alters the variability of precipitation and the quantity of available water. At the same time, demand for water is increasing due to the world's growing population and its mounting aspirations. This dynamic triggers distributional conflicts and poses major challenges to water management systems in the

countries concerned. For example, regions which depend on melt water from mountain glaciers – which are at risk from climate change – will require new water management strategies and infrastructures, as well as political efforts to avert national or even transboundary conflicts over the distribution of increasingly scarce water resources. However, the countries which will suffer the greatest water stress are generally those which already lack the political and institutional framework necessary for the adaptation of water and crisis management systems. This could overstretch existing conflict resolution mechanisms, ultimately leading to destabilization and violence.

- *Conflict constellation "Climate-induced decline in food production"*: More than 850 million people worldwide are currently undernourished. This situation is likely to worsen in future as a result of climate change, as food insecurity in the lower latitudes, i.e. in many developing countries, will increase with a temperature rise of just 2°C (relative to the 1990 baseline). With global warming of 2–4°C, a drop in agricultural productivity is anticipated worldwide. This trend will be substantially reinforced by desertification, soil salinization or water scarcity. In South Asia and North Africa, for example, the areas suitable for agriculture are already largely exploited. This may well trigger regional food crises and further undermine the economic performance of weak and unstable states, thereby encouraging or exacerbating destabi-

bilization, the collapse of social systems, and violent conflicts.

- *Conflict constellation “Climate-induced increase in storm and flood disasters”*: Climate change is likely to result in further sea-level rise and more intensive storms and heavy precipitation. This will greatly increase the risk of natural disasters occurring in many cities and industrial regions in coastal zones. Those risks will be further amplified by deforestation along the upper reaches of rivers, land subsidence in large urban areas and the ever greater spatial concentration of populations and assets. Storm and flood disasters have already contributed to conflict in the past, especially during phases of domestic political tension, e.g. in Central America, India and China. Conflicts are likely to occur more frequently in future, firstly because regions especially at risk from storm and flood disasters, such as Central America and Southern Africa, generally have weak economic and political capacities, making adaptation and crisis management much more difficult. Secondly, frequent storm and flood disasters along the densely populated east coasts of India and China could cause major damage and trigger and/or intensify migration processes that are difficult to control.
- *Conflict constellation “Environmentally-induced migration”*: Experience has shown that migration can greatly increase the likelihood of conflict in transit and target regions. It can be assumed that the number of environmental migrants will substantially rise in future due to the impacts of climate change. In developing countries in particular, the increase in drought, soil degradation and growing water scarcity in combination with high population growth, unstable institutions, poverty or a high level of dependency on agriculture means that there is a particularly significant risk of environmental migration occurring and increasing in scale. Most environmental migration is initially likely to occur within national borders. Transboundary environmental migration will mainly take the form of south-south migration, but Europe and North America must also expect substantially increased migratory pressure from regions most at risk from climate change. The question as to which states will have to bear the costs of environmentally-induced migration in future also contains conflict potential.

Regional hotspots

The social impacts of climate change will vary in the different regions of the world. A glance at the world map shown in Figure 1, entitled “Security risks asso-

ciated with climate change”, shows selected regional hotspots identified as a result of WBGU’s analysis:

North Africa: The potential for political crisis and migratory pressure will intensify as a result of the interaction between increasing drought and water scarcity, high population growth, a drop in agricultural potential and poor political problem-solving capacities. The populous Nile Delta will be at risk from sea-level rise and salinization in agricultural areas.

Sahel zone: Climate change will cause additional environmental stress and social crises (e.g. drought, harvest failure, water scarcity) in a region already characterized by weak states (e.g. Somalia, Chad), civil wars (e.g. Sudan, Niger) and major refugee flows (Sudan: more than 690,000 people; Somalia: more than 390,000 people).

Southern Africa: Climate change could further weaken the economic potential of this region, whose countries already belong to the poorest in the world in most cases. It could also worsen the conditions for human security and overstretch the capacities of states in the region.

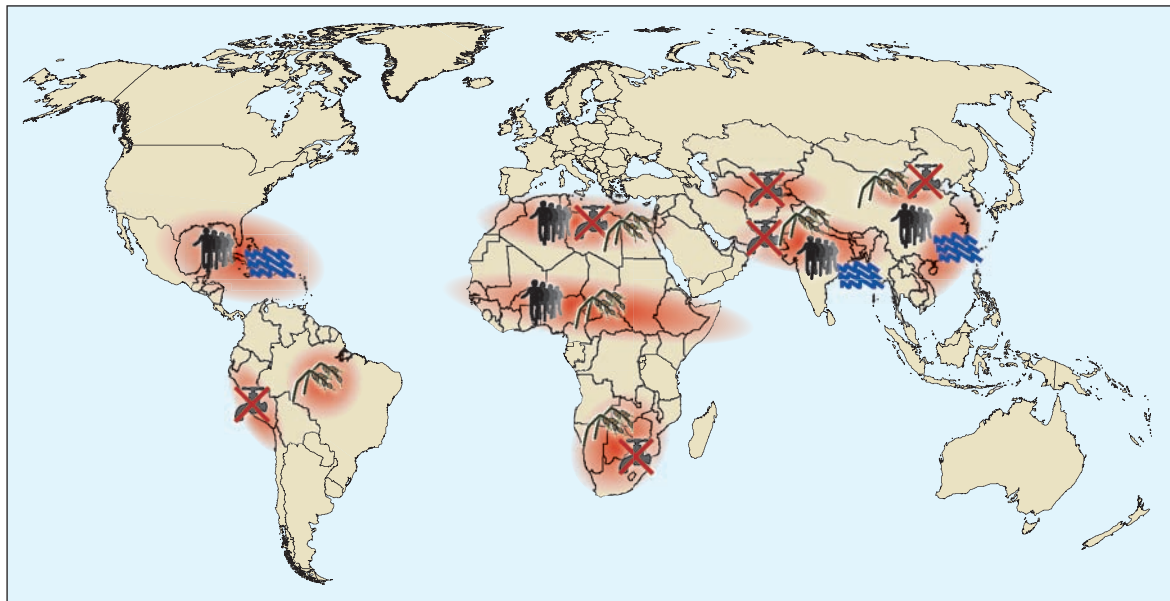
Central Asia: Above-average warming and glacial retreat will exacerbate the water, agricultural and distributional problems in a region which is already characterized by political and social tensions, burgeoning Islamism, civil war (Tajikistan) and conflicts over access to water and energy resources.

India, Pakistan, Bangladesh: The impacts of climate change will be especially severe in this region: glacial retreat in the Himalayas will jeopardize the water supply for millions of people, changes to the annual monsoon will affect agriculture, and sea-level rise and cyclones will threaten human settlements around the populous Bay of Bengal. These dynamics will increase the social crisis potential in a region which is already characterized by cross-border conflicts (India/Pakistan), unstable governments (Bangladesh/Pakistan) and Islamism.

China: Climate change will intensify the existing environmental stress (e.g. air and water pollution, soil degradation) due to the increase in heat waves and droughts, which will worsen desertification and water scarcity in some parts of the country. Sea-level rise and tropical cyclones will threaten the economically significant and populous east coast. The government’s steering capacities could be overwhelmed by the rapid pace of modernization, environmental and social crises and the impacts of climate change.

Caribbean and the Gulf of Mexico: Increased frequency of more intense hurricanes could overwhelm the economic and political problem-solving capacities in the region (especially in Central America).

Andean region and Amazonia: Faster glacial retreat in the Andes will worsen the region’s water problems.



Conflict constellations in selected hotspots



Climate-induced degradation of freshwater resources



Climate-induced decline in food production



Hotspot



Climate-induced increase in storm and flood disasters



Environmentally-induced migration

Figure 1

Security risks associated with climate change: Selected hotspots. The map only shows the regions which are dealt with in this report and which could develop into crisis hotspots.

Source: WBGU

The collapse of the Amazon rainforest, which cannot be ruled out, would radically alter South America's natural environment, with incalculable economic and social consequences.

Unstable multipolarity: The international policy setting of climate change

WBGU assumes that China and India in particular, due to their population size and economic dynamics, will gain more global political significance in the near future. The United States of America – currently the world's only superpower – is likely to experience a relative loss of power at the same time. The ascendancy of China and India therefore marks a major shift in the centres of power of the political world order, which will move from a unipolar to a multipolar system. A glance back at history shows that transitions from one type of world order to another rarely take place peacefully. The ensuing political, institutional and socio-economic turbulence and adaptation requirements can trigger major conflicts of interests within the international community and increase

countries' vulnerability to armed conflict. That is not to say that the transformation processes which are anticipated in the international arena in the future will necessarily be violent. They will, however, absorb valuable time and resources which would then no longer be available for effective climate policy, for example.

Global politics over the next two decades will therefore have to master two challenges in parallel: the shift in the centres of power of the political world order, and the global turnaround towards effective climate policy. For both challenges, the stabilization and further development of the multilateral system are essential. Ultimately, the future interaction of old and new global political actors will be one of the factors that crucially determine whether and how the global challenges and risks arising in the 21st century can be managed successfully, and which role the "rest of the world" can play in this context. Climate policy is a case in point: without constructive cooperation between the OECD countries and the new drivers of global change, it will not be possible to limit climate change in a way which avoids destabilizing social impacts and threats to international security.

Six threats to international stability and security

In light of current knowledge about the social impacts of climate change, WBGU identifies the following six key threats to international security and stability which will arise if climate change mitigation fails:

1. *Possible increase in the number of weak and fragile states as a result of climate change:* Weak and fragile states have inadequate capacities to guarantee the core functions of the state, notably the state's monopoly on the use of force, and therefore already pose a major challenge for the international community. So far, however, the international community has failed to summon the political will or provide the necessary financial resources to support the long-term stabilization of these countries. Moreover, the impacts of unabated climate change would hit these countries especially hard, further limiting and eventually overstressing their problem-solving capacities. Conflict constellations may also be mutually reinforcing, e.g. if they extend beyond the directly affected region through environmental migration and thus destabilize other neighbouring states. This could ultimately lead to the emergence of "failing subregions" consisting of several simultaneously overstretched states, creating "black holes" in world politics that are characterized by the collapse of law and public order, i.e. the pillars of security and stability. It is uncertain at present whether, against the backdrop of more intensive climate impacts, the international community would be able to curb this erosion process effectively.
2. *Risks for global economic development:* Climate change will alter the conditions for regional production processes and supply infrastructures. Regional water scarcity will impede the development of irrigated agriculture and other water-intensive sectors. Drought and soil degradation will result in a drop in agricultural yields. More frequent extreme events such as storms and flooding put industrial sites and the transport, supply and production infrastructures in coastal regions at risk, forcing companies to relocate or close production sites. Depending on the type and intensity of the climate impacts, this could have a significant and adverse effect on the global economy. Unabated climate change is likely to result in substantially reduced rates of growth. This will increasingly limit the economic scope, at national and international level, to address the urgent challenges associated with the Millennium Development Goals.
3. *Risks of growing international distributional conflicts between the main drivers of climate change and those most affected:* Climate change is mainly caused by the industrialized and newly industrializing countries. The major differences in the per capita emissions of industrialized and developing/newly industrializing countries are increasingly regarded as an "equity gap", especially as the rising costs of climate change are mainly being borne by the developing countries. The greater the damage and the burden of adaptation in the South, the more intensive the distributional conflicts between the main drivers of climate change and those most affected will become. The worst affected countries are likely to invoke the "polluter pays" principle, so international controversy over a global compensation regime for climate change will probably intensify. Beside today's industrialized countries, the major ascendant economies whose emissions are increasing substantially, notably China but also India and Brazil, for example, will also be called to account by the developing countries in future. A key line of conflict in global politics in the 21st century would therefore divide not only the industrialized and the developing countries, but also the rapidly growing newly industrializing countries and the poorer developing countries. The international community is ill-prepared at present for this type of distributional conflict.
4. *The risk to human rights and the industrialized countries' legitimacy as global governance actors:* Unabated climate change could threaten livelihoods, erode human security and thus contribute to the violation of human rights. Against the backdrop of rising temperatures, growing awareness of social climate impacts and inadequate climate change mitigation efforts, the CO₂-emitting industrialized countries and, in future, buoyant economies such as China could increasingly be accused of knowingly causing human rights violations, or at least doing so in *de facto* terms. The international human rights discourse in the United Nations is therefore also likely to focus in future on the threat that climate impacts pose to human rights. Unabated climate change could thus plunge the industrialized countries in particular into crises of legitimacy and limit their international scope for action.
5. *Triggering and intensification of migration:* Migration is already a major and largely unresolved international policy challenge. Climate change and its social impacts will affect growing numbers of people, so the number of migration hotspots around the world will increase. The associated conflict potential is considerable, especially as "environmental migrants" are currently not provided for in international law. Disputes over compensation payments and the financing of systems to manage refugee crises will increase. In line with

the “polluter pays” principle, the industrialized countries will have to face up to their responsibilities. If global temperatures continue to rise unabated, migration could become one of the major fields of conflict in international politics in future.

6. *Overstretching of classic security policy:* The future social impacts of unabated climate change are unlikely to trigger “classic” inter-state wars; instead, they will probably lead to an increase in destabilization processes and state failure with diffuse conflict structures and security threats in politically and economically overstretched states and societies. The specific conflict constellations, the failure of disaster management systems after extreme weather events and increasing environmental migration will be almost impossible to manage without support from police and military capacities, and therefore pose a challenge to classic security policy. In this context, a well-functioning cooperation between development and security policy will be crucial, as civilian conflict management and reconstruction assistance are reliant on a minimum level of security. At the same time, the largely unsuccessful operations by highly equipped military contingents which have aimed to stabilize and bring peace to weak and fragile states since the 1990s show that “classic” security policy’s capacities to act are limited. A climate-induced increase in the number of weak and fragile states or even the destabilization of entire subregions would therefore overstretch conventional security policy.

Overstretching the capacities of the global governance system

The greater the scale of climate change, the greater the probability that in the coming decades, climate-induced conflict constellations will impact not only on individual countries or subregions but also on the global governance system as a whole. These new global risk potentials can only be countered by policies that aim to manage global change. Every one of the six threats to international stability and security, outlined above, is itself hard to manage. The interaction between these threats intensifies the challenges for international politics. It is almost inconceivable that in the coming years, a global governance system could emerge with the capacity to respond effectively to the conflict constellations identified by WBGU. Against the backdrop of globalization, unabated climate change is likely to overstretch the capacities of a still insufficient global governance system.

As the climate-induced security risks of the 21st century have their own specific characteristics, they

will be difficult to mitigate through classic military interventions. Instead, an intelligent and well-crafted global governance strategy to mitigate these new security risks would initially consist of an effective climate policy, which would then evolve into a core element of preventive security policy in the coming decades. The more climate change advances, the more important adaptation strategies in the affected countries will become, and these must be supported by international development policy. At international level, the focus will be on global diplomacy to contain climate-induced conflicts, as well as on the development of compensation mechanisms for those affected by climate change, global migration policy, and measures to stabilize the world economy. The opportunities to establish a well-functioning global governance architecture will narrow as global temperatures rise, revealing a vicious circle: climate change can only be combated effectively through international cooperation, but with advancing climate change, the basis for constructive multilateralism will diminish. Climate change thus poses a challenge to international security, but classic, military-based security policy will be unable to make any major contributions to resolving the impending climate crises.

Recommendations

As yet, there is little sign of climate change manifesting itself in the form of conflict constellations and social crises. Globally averaged surface temperatures have so far increased by 0.8°C relative to the pre-industrial value. Without more intensified mitigation efforts, it must be assumed that by the end of the 21st century, globally averaged surface temperatures will rise by 2–7 °C relative to the pre-industrial value, depending on the amount of greenhouse gases emitted and the uncertainties in the climate system. In WBGU’s view, climate policy thus becomes preventive security policy, for if climate policy is successful in limiting the rise in globally averaged surface temperatures to no more than 2 °C relative to the pre-industrial value, the climate-induced threat to international security would likely be averted. Conversely, WBGU anticipates that in the event of mitigation efforts failing, climate-induced security risks will begin to manifest themselves in various regions of the world from around 2025–2040. The key challenge is to take resolute climate policy action within the next 10–15 years, in order to avert the socio-economic distortions and implications for international security that will otherwise intensify in subsequent decades.

Fostering a cooperative setting for a multipolar world

Initiative 1: Shaping global political change

In order to ensure the acceptance and, above all, the constructive participation of the ascendant new world powers China and India, a multilateral order is needed which is viewed as fair by all countries. Germany can act as a pioneer here by undertaking the important and necessary advocacy work within the EU and working pro-actively at international level for the adoption of confidence-building measures. One option, for example, is to initiate and institutionalize a theme-specific process, modelled on the Conference on Security and Co-operation in Europe (CSCE) and aimed at confidence-building worldwide.

Germany and the EU should invest to a far greater extent than before in a coherent, future-oriented common foreign and security policy and set aside national egotisms. One issue to be explored is whether convening a world conference to consider the implications of the anticipated shift in the centres of power of the political world order could help foster a positive climate of cooperation. The diffuse uncertainty in the face of geopolitical change could perhaps then be channelled constructively. The aim would be to generate a positive mood that is conducive to a fresh start, emphasizing and building on the opportunities afforded by the anticipated changes.

Climate policy and energy policy offer ideal fields of action for Europe to play a pioneering international role. More intensive efforts to achieve resolute, fair and targeted international cooperation in the fields of climate protection and poverty reduction would also consolidate multilateral institutions as a whole and thus contribute to peaceful development in the world.

Initiative 2: Reforming the United Nations

As environmentally-induced conflicts and the associated security issues are likely to increase in significance, the question which arises is which role the United Nations and its various institutions should play in managing the ensuing problems. In general, WBGU is in favour of better coordinating the efforts of the relevant organizations and programmes under the auspices of the UN and significantly enhancing their role in the interests of prevention.

REFLECTING ON THE ROLE AND TASKS OF THE UN SECURITY COUNCIL

In WBGU's view, the impacts of unabated climate change, severe environmental degradation and environmentally-induced conflicts can be regarded as a threat to international security and world peace. Presumably, therefore, the Security Council is authorized to take action in cases of widespread destruction of natural environmental goods and grave violations of international environmental law, and can apply appropriate sanctions against the states responsible. The Security Council now having debated in depth the security policy implications of climate change for the first time in April 2007, the question which arises is whether and how the Security Council's mandate can be appropriately adapted to meet these challenges. One option is to invoke the principle of the "responsibility to protect" by means of which the United Nations claims high moral authority. The Security Council could perhaps charge the UN Peacebuilding Commission, newly established in 2005, with addressing the specific tasks arising from this principle.

UPGRADING THE UNITED NATIONS ENVIRONMENT PROGRAMME

WBGU reaffirms its recommendation that the United Nations Environment Programme (UNEP) be strengthened and upgraded by granting it the status of a UN specialized agency. Until that happens, UNEP and the Environmental Management Group should be actively supported by the member states in order to improve coordination of the numerous institutions engaged in international environmental policy and link environmental themes more closely with the United Nations' work in the economic and social fields. To this end, adequate medium- and long-term financing for UNEP should also be guaranteed.

STRENGTHENING THE UNITED NATIONS' DEVELOPMENT CAPACITIES

WBGU reiterates its call for the establishment, in the long term, of a high-level Council on Global Development and Environment within the UN system, which ideally would replace the largely ineffective Economic and Social Council (ECOSOC). In the short term, WBGU recommends that policy be guided by the pragmatic proposals made by the High-Level Panel on System-wide Coherence and that a UN Sustainable Development Board be established, reporting to ECOSOC. The Board should be granted substantial political authority at the level of the heads of state and government and exercise joint supervision of relevant UN programmes, thus curbing the fragmentation of the UN development system.

Climate policy as security policy I: Preventing conflict by avoiding dangerous climate change

WBGU has made recommendations in various previous reports and policy papers on the specific form that an effective climate protection policy should take. For that reason, the following initiatives merely briefly outline, in key words, the topical and important fields of action for climate change mitigation.

Initiative 3: Ambitiously pursuing international climate policy

MAKING THE 2 °C GUARD RAIL AN INTERNATIONAL STANDARD

Specific international targets with a long-term focus increase the prospects of implementing a successful climate policy which initiates the global technological revolution and the shift in attitudes that are necessary to stabilize the concentration of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. At international level, a consensus must therefore be reached on quantifying the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) as set out in its Article 2. To this end, WBGU recommends the adoption, as an international standard, of a global temperature guard rail limiting the rise in near-surface air temperature to a maximum of 2 °C relative to the pre-industrial value. This will require a 50 % reduction in global greenhouse gas emissions by 2050 compared with a 1990 baseline.

GEARING THE KYOTO PROTOCOL TOWARDS THE LONG TERM

The mechanism established under Article 9 UNFCCC to review the Kyoto Protocol should be utilized for the ambitious further development of this Protocol and its compliance mechanisms. In WBGU's view, equal per capita allocation of emission entitlements on a global basis is the allocation formula which should be aimed for in the long term. All countries must ultimately play a part in achieving this goal. For the second commitment period of the Kyoto Protocol, the industrialized countries should adopt ambitious goals in the order of a 30 % effective reduction in greenhouse gas emissions by 2020 against the 1990 baseline. In order to integrate newly industrializing and developing countries into mitigation efforts to a greater extent, WBGU recommends the adoption of a more flexible approach to the setting of reduction commitments and clear differentiation within this country group.

CONSERVING NATURAL CARBON STOCKS

Preserving the natural carbon stocks of terrestrial ecosystems should be a key goal of future climate protection policy alongside the reduction of greenhouse gas emissions from the use of fossil fuels. Tropical forest conservation should be a particular priority in this context.

Initiative 4: Implementing the energy turnaround in the EU

STRENGTHENING THE EU'S LEADING ROLE

In order to be a credible negotiating partner within the climate process, the European Union should achieve its Kyoto commitments and set more far-reaching and ambitious reduction targets for the future. In WBGU's view, a 30 % reduction target for greenhouse gas emissions by 2020 compared with the 1990 baseline and an 80 % reduction target by 2050 are appropriate.

IMPROVING AND IMPLEMENTING THE ENERGY POLICY FOR EUROPE

In WBGU's view, the proposals for an Energy Policy for Europe, presented by the European Commission in January 2007, point in the right direction and their basic elements should be adopted and rigorously implemented by the Member States. Binding targets, threshold values and timetables are essential to make the Energy Policy for Europe more specific. However, WBGU also sees a need for improvement in relation to certain expansion targets and individual technological options. Overall, the proposals should be geared more strongly towards sustainability criteria such as those proposed by WBGU in its report on sustainable energy systems.

TRIGGERING AN EFFICIENCY REVOLUTION

The proposals set out in the Energy Efficiency Action Plan, as well as existing directives and regulations, provide a sound basis for the necessary improvements in energy efficiency. The potential energy savings of 20 % by 2020, cited in the Action Plan and endorsed by the European Council, should be increased substantially through binding European rules, ambitious national targets and the rigorous enforcement of existing legislation. This applies especially to buildings, cars and product standards. Here, dynamic standards should be set which progressively lead to a reduction in energy input and emissions and thus establish long-term objectives for technological development as well.

EXPANDING RENEWABLES

WBGU proposes that in addition to the targets put forward in the Energy Policy for Europe and reaffirmed by the European Council, a binding target of 40 % of renewables in electricity generation by 2020 be adopted, along with a figure of 25 % of renewables in primary energy production. However, renewables expansion should not take place at the expense of other dimensions of sustainability; this applies especially to bioenergy or hydropower. Key prerequisites for the efficient integration of renewables are unimpeded access to the (national) grids and their fusion into a high-capacity trans-European grid.

Initiative 5: Developing mitigation strategies through partnerships

ESTABLISHING CLIMATE PROTECTION AS A CROSS-CUTTING THEME IN DEVELOPMENT COOPERATION

In development cooperation, path dependencies of emissions-intensive technologies should be avoided, and high priority should be granted to the promotion of sustainable energy systems in order to overcome energy poverty. To this end, climate protection must be integrated as a cross-cutting theme into poverty reduction strategies from the outset. A further key field of action for climate protection in developing countries is the avoidance of emissions from land-use changes, especially deforestation. Within the German Ministry for Economic Cooperation and Development (BMZ) and the institutions of German Technical Cooperation (GTZ) and Financial Cooperation (KfW), and also within the framework of donor coordination in the European Union, poverty reduction and climate protection strategies should be “joined up” more systematically and far more rigorously than before.

AGREEING DECARBONIZATION PARTNERSHIPS WITH NEWLY INDUSTRIALIZING COUNTRIES

Germany and the EU should enter into strategic decarbonization partnerships with those newly industrializing countries that are likely to play an important role in the future world’s energy sector. The aim should be to move energy systems and energy efficiency towards sustainability, thus providing innovative impetus and acting as a role model on a worldwide basis. Especially China and India could be partners in this area.

AGREEING AN INNOVATION PACT WITHIN THE FRAMEWORK OF G8+5

The G8+5 forum should be utilized for the development of joint targets for the promotion of climate-compatible technologies and products. This group,

comprising the world’s leading industrial nations and newly industrializing countries, represents the heavyweights in the global political arena and accounts for around two-thirds of global greenhouse gas emissions. On the basis of national Road Maps charting the transformation of national energy systems in the interests of climate protection, a joint Road Atlas for the Decarbonization of Energy Systems could then be produced. By adopting joint parameters for efficiency and CO₂ emissions standards, and promoting comprehensive technological cooperation, the G8+5 countries have the potential to become the driving force in the transformation of the world’s energy systems.

Climate policy as security policy II: Preventing conflict by implementing adaptation strategies

Initiative 6: Supporting adaptation strategies for developing countries

Climate change will hit developing countries especially hard. Timely adaptation measures should therefore be an integral element of their national policies. However, most developing countries lack the skills and capacities to implement effective adaptation measures. Moreover, the impacts of climate change will increase the vulnerability of weak and fragile states and further reduce their adaptive capacities. This has yet to be fully recognized by many German and international development institutions.

ADAPTING WATER RESOURCES MANAGEMENT TO CLIMATE CHANGE AND AVOIDING WATER CRISES

- *Promoting international cooperation on the provision of information:* In order to adapt water resources management to the impacts of climate change, it is essential to draw on the findings of regional models which take account of climate change. International cooperation is vital to facilitate developing countries’ access to current scientific data on the regional impacts of climate change on water availability. One issue which should be explored is whether a universally accessible database could be established and maintained by the international community for this purpose. In order to avoid water conflicts, cooperation on transboundary water management should be encouraged for regions sharing waters.
- *Reorienting water management towards action under increased uncertainty:* For effective action to be taken, there is often no need to await the development of appropriate forecasting models. Measures which improve adaptation to existing

climate variability can often be applied to adaptation to future climate impacts as well. This is especially true of measures to improve the efficiency of water management, local water storage capacity, systems for the distribution of stored water, and demand management. Integrated water resources management offers a suitable framework here.

GEARING AGRICULTURE TO CLIMATE CHANGE

- *Strengthening and reorienting rural development:* Greater account must be taken of climate change in the FAO scenarios. At the same time, in view of the anticipated drop in agricultural yields, development cooperation should focus to a greater extent on the development of rural regions. However, it is not enough simply to invest more resources in strengthening the agricultural sector. Instead, a new qualitative focus is required in agricultural development strategies in light of climate change.
- *Reforming world agricultural markets:* The reform of world agricultural markets should be pursued vigorously in order to generate opportunities for market access and production incentives in the developing countries. However, liberalization leads to price increases which can have an extremely adverse effect on Low-Income Food-Deficit Countries. For that reason, it is particularly important to establish compensation mechanisms for these countries, akin to those already in place in the WTO or the Bretton Woods institutions. The German Government should endeavour to ensure that such compensation mechanisms are adequately resourced.
- *Taking account of many developing countries' growing dependency on food imports:* The liberalization of the agricultural markets and short-term compensation payments will not solve the long-term supply and demand problems faced by many developing countries. A number of developing countries will experience major drops in agricultural yields and growing dependency on farm imports, not least as a result of climate change. For that reason, international climate policy should focus to a greater extent on this issue as well. One option which could be considered is whether those countries which are the main drivers of climate change should pay compensation to other adversely affected states for world market price increases and climate-related drops in agricultural yields.

STRENGTHENING DISASTER PREVENTION

- *Developing cross-sectoral approaches in development cooperation:* Development cooperation should develop and implement cross-sectoral strategies for the prevention of disaster risks

to a greater extent, focussing especially on emergency planning, adaptation of land-use planning, establishment of clear decision-making structures at an early stage, and the inclusion of disaster prevention in education programmes. Early warning systems should also be embedded in development programmes.

- *Integrating disaster risks into development strategies to a greater extent:* Disaster prevention should be taken into account from the outset in the preparation of Poverty Reduction Strategy Papers and in the major poverty reduction programmes.
- *Reviewing disaster prevention in industrialized countries:* Disaster prevention should not be limited to the developing countries. Industrialized countries are also vulnerable to disasters. WBGU recommends a review of disaster prevention systems in the industrialized countries, especially in light of the challenges posed by ongoing climate change.

Initiative 7: Stabilizing fragile states and weak states that are additionally threatened by climate change

It is likely that the additional problems caused by climate change will impede the stabilization of weak and fragile states, and may even trigger further destabilization. Crisis prevention costs far less than crisis management at a later stage. The implications of climate change for the scale, longevity and financing of possible German contributions to the stabilization of fragile states should be taken into account to a greater extent in the Action Plan "Civilian Crisis Prevention, Conflict Resolution and Post-Conflict Peace-Building". The debate should be conducted first and foremost within the European Union framework. In this context, WBGU recommends, in particular, the operationalization of the Solana Strategy in line with the Barcelona Report, which prioritizes crisis prevention with the aim of avoiding military intervention as far as possible.

The German Government should therefore continue to play an active role in the Fragile States Group set up by the OECD's Development Assistance Committee and drive forward the implementation and further development of its Principles for Good International Engagement in Fragile States and Situations. In particular, WBGU recommends that the German Government endeavours to ensure that appropriate account is taken, in this context, of the environmental impacts and risks arising from climate change. Specifically, fragile states' capacities to manage environmental risks must be maintained

and reinforced, and if necessary re-established, even under difficult political and economic conditions.

Initiative 8: Managing migration through cooperation and further developing international law

DEVELOPING COMPREHENSIVE INTERNATIONAL STRATEGIES FOR MIGRATION

In order to manage environmentally-induced migration, a comprehensive migration policy strategy is required which takes account of the interests of all stakeholders. Its long-term objectives must be geared towards the interests of the destination, transit and home countries alike. In WBGU's view, an approach which focuses primarily on the industrialized countries' internal security – current EU policy being a case in point – is too one-sided, reactive and, at best, only effective in the short term. Prevention strategies do not feature in the numerous bilateral readmission agreements between the industrialized nations and countries of origin. WBGU recommends that at future international migration forums, environmentally-induced migration feature on the agenda and that appropriate plans be developed to deal with this issue. Focussing solely on economically motivated migration is not enough. Germany and the EU must step up their engagement in this area.

INTEGRATING MIGRATION POLICY INTO DEVELOPMENT COOPERATION

In the Least Developed Countries, unabated climate change would increase the risk of people being forced to abandon their home regions due to the collapse of their natural life-support systems. Development cooperation can help to strengthen the adaptive capacities of people living in absolute poverty and thus make it easier for them to remain in their homes. However, development strategies must take greater account of foreseeable climate impacts at local level. It can be assumed that climate-induced migration within and between affected states will increase in future, opening up a new field of action in development cooperation. The importance of a comprehensive, pro-active and development-oriented migration policy is increasingly being recognized at political level as well.

ENSHRINING THE PROTECTION OF ENVIRONMENTAL MIGRANTS IN INTERNATIONAL LAW

Environmental migrants currently do not fit into the agreed categories of international refugee and migration law, even though a strong increase in environmentally-induced migratory movements is anticipated. Under current international refugee law, states

have no specific obligations in relation to the treatment of environmental migrants, nor are any other legal mechanisms in place for the protection of the affected individuals. In the interests of improving the legal status and protection of environmental migrants, it is important to consider ways of closing this gap in international law. WBGU recommends that rather than adopting an additional protocol to the existing United Nations Convention Relating to the Status of Refugees, vigorous efforts be made at this stage to establish a cross-sectoral multilateral Convention aiming at the issue of environmental migrants. UNHCR should be involved as fully as possible in negotiations on the adoption of the requisite international agreement. This agreement should institutionalize the cooperation between UNHCR and the bodies established within the framework of the participating conventions. Furthermore, the United Nations' efforts to protect internally displaced persons, which have already begun, should be intensified.

Initiative 9: Expanding global information and early warning systems

Both the gradual changes caused by climate change and the natural disasters which are expected to occur with increasing frequency could destabilize the affected regions and, in extreme cases, constitute a major risk factor for national and international security. Global information and early warning systems can therefore do much to mitigate these adverse effects and make a major contribution to conflict and crisis prevention.

On the one hand, these systems should provide timely information and warning in advance of extreme events and crises. The German Government, which has been active in this area for many years, should continue to participate in the development of a global early warning system. The system should not be confined to individual risks but should address threats to human security on a comprehensive basis. This early warning system should provide information about all types of natural hazard, epidemics and technological risks, and also take account of slowly advancing environmental changes.

On the other hand, the system must provide processed data on expected regional climate impacts, especially for developing countries which lack adequate capacities of their own to model and evaluate these data. This type of database should collate regional forecasts, with all their uncertainties, and make them accessible in an easy-to-understand format for users.

In order to establish this type of global informa-

tion and early warning system, the activities of existing UN institutions (e.g. WMO, FAO, UNDP, UNEP, UNFCCC) and other forums such as ISDR or IPCC must be properly coordinated.

Financing the initiatives

The prevention of environmentally-induced security risks not only requires resolute political action by the relevant national and international actors, but also adequate financial resources to implement the measures.

Avoiding dangerous climate change

Climate protection is worthwhile: The global costs of effective climate protection are far lower than the costs of inaction. What is required now is international coordination in order to ensure that the financial resources are channelled into efficient mitigation measures.

TRANSFORMING ENERGY SYSTEMS WORLDWIDE

In order to initiate the necessary transformation of energy systems in the developing countries, the existing multilateral funds (e.g. Global Environment Facility, Carbon Finance Unit) should be boosted by better and more reliable financing. Additional sources of funding can be harnessed through new financing instruments such as the introduction of emissions-independent user charges for aviation and shipping, unless these emissions are already covered by other regulatory schemes. In the longer term, a system of internationally tradable quotas for renewable energies can also generate revenue. Financial resources can also be mobilized by restructuring existing budgets: subsidies for fossil fuels can be progressively reduced, freeing up funds which can then be channelled into the promotion and global deployment of renewable energies.

CONSERVING TERRESTRIAL CARBON STOCKS

The protection of terrestrial carbon stocks, especially the tropical forests, should be a further funding priority. A large proportion of this forest stock is located in developing countries, but is under threat from over-exploitation and deforestation. The industrialized countries should actively promote the conservation of these forests. The UNFCCC process to reduce deforestation in developing countries offers a good starting point and should be pursued as a matter of urgency. In particular, the Annex I countries under the UNFCCC regime should provide incentives, in the form of financial compensation for loss of income

from alternative land use, to encourage these countries to refrain from deforestation.

Adaptation to unavoidable climate change

Developing countries generally contribute very little to anthropogenic climate change, but they still have to adopt comprehensive adaptation measures which they often cannot afford due to a lack of capital. For that reason, adaptation measures in these countries should be co-financed by the international community.

BOOSTING OFFICIAL DEVELOPMENT ASSISTANCE

The funding of Official Development Assistance (ODA) is still failing to reach the target of 0.7 % of gross national income agreed by the United Nations. In May 2005, the European Union's development ministers set a new intermediate target for development aid of 0.56 % of donor countries' gross national income by 2010, which would put Europe on course to reach the UN's 0.7 % target by 2015. This timetable must be rigorously adhered to.

DEVELOPING A UNFCCC ADAPTATION STRATEGY

WBGU recommends that a comprehensive strategy be developed to promote adaptation in the developing and newly industrializing countries. The Funds so far established under the UNFCCC and the Kyoto Protocol are inadequate to meet the challenges described above, both in terms of their volume and their institutional structures. The financial contributions made by individual states to this strategy should be based on their contribution to global warming and their economic capacities. In the short term, more resources should be made available to the Least Developed Countries Fund and the adaptation "window" of the Special Climate Change Fund.

STRENGTHENING MICROFINANCE

Microfinancing institutions and instruments (e.g. microcredits or microinsurance) should be expanded with resources from international development cooperation. Despite great hopes that microinsurance, for example, could be a suitable instrument to guard against climate-induced natural disasters, microfinancing cannot replace – but at best can only supplement – international financial assistance.

ESTABLISHING AN ENVIRONMENTAL MIGRATION FUND

A new international environmental migration fund should provide the financial basis for measures to deal with environmental migrants. The International Dialogue on Migration launched by the Interna-

tional Organization for Migration in 2001 offers an appropriate platform for this purpose. Fair and efficient burden-sharing between those countries which are affected by environmental migration and those which are not should satisfy the “polluter pays” principle, described above, and the “ability-to-pay” principle by linking contributions to the Fund to the level of country-specific greenhouse gas emissions and other indicators such as gross domestic product.

Financing international conflict prevention

ADOPTING AN INTEGRATED APPROACH TO THE FINANCING OF CRISIS PREVENTION, DEVELOPMENT COOPERATION AND MILITARY SPENDING

Due to the clear overlaps between civilian crisis prevention and development cooperation, WBGU takes the view that there is no need for an additional funding target for crisis prevention. Instead, the political focus should be geared entirely towards compliance with the existing timetable for increasing ODA. WBGU proposes that security spending be critically reviewed, especially as regards its effectiveness for international peacebuilding, and adjusted accordingly. The German Government should drive forward the international debate and negotiating processes within the EU, NATO and beyond. Military budgets should be restructured in favour of preventive measures in the field of development cooperation. As military spending is realigned towards preventive security policy, the need for funding in the “classic” areas of military spending will be reduced.

STRENGTHENING THE FINANCIAL INSTITUTIONS IN THE UN SYSTEM

The mechanisms to finance international crisis prevention and peacebuilding regimes at UN level are inadequately resourced, in WBGU’s view. The German Government should support the Central Emergency Response Fund with appropriate contributions and lobby for a binding schedule for the financing of this Fund. It should also continue to take an active role in financing the UN Trust Fund for the Consolidation of Peace and lobby for the adoption of rules to ensure regular contributions to the Fund in future.

If climate protection fails: Strategies in the event of destabilization and conflict

If climate protection fails and the 2°C guard rail is not adhered to, the international community must prepare itself to deal with climate-induced conflicts such those described as “conflict constellations”. In any event, a pro-active climate protection policy must

remain in place to mitigate greenhouse gas emissions, with the aim of keeping global warming as close to the 2°C guard rail as possible. Due to the anticipated high costs of mitigation and adaptation, economic policy should also develop strategies to avert the possible destabilization of the global economy as a result of climate change. In the field of development policy, the need to manage water and food crises and storm and flood disasters would also substantially increase. In view of the growing number of weak and fragile states and an increasingly degraded natural environment, development cooperation would be called upon more and more frequently to prevent human development from dropping back, rather than advancing development as is currently the case.

The increase in migration worldwide – both within developing regions and between North and South – would absorb considerable political and economic capacities. Overall, major disruptions in international relations could be anticipated, not least in the North-South context. In order to avert destabilization and the escalation of conflicts, the crisis management potential of the world’s leading powers should be pooled, the multilateral institutional architecture strengthened, and substantial additional resources mobilized. If climate protection policy fails and these efforts are not made, it is likely that from the mid 21st century local and regional conflicts will proliferate and the international system will be destabilized, threatening global economic development and completely overstressing global governance structures. In order to avoid these dangerous developments, the appropriate climate policy course must be set now.

Publications of the German Advisory Council on Global Change (WBGU)

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The German Advisory Council on Global Change

(Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen – WBGU)

WBGU is an independent, scientific advisory body to the German Federal Government set up in 1992 in the run-up to the Rio Earth Summit. The Council has nine members, appointed for a term of four years by the federal cabinet. The Council is supported by an interministerial committee of the federal government comprising representatives of all ministries and of the federal chancellery. The Council's principal task is to provide scientifically-based policy advice on global change issues to the German Federal Government. The Council:

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- provides early warning of new issue areas,
- identifies gaps in research and initiates new research,
- monitors and assesses national and international policies for the achievement of sustainable development,
- elaborates recommendations for action, and
- raises public awareness and heightens the media profile of global change issues.

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