Kyoto II and 'Houston Protocol' - on the future of international climate policy

Simonis, Udo E.

Udo E. Simonis

Kyoto II and ‚Houston Protocol' –
On the Future of International Climate Policy *

Best.-Nr. P 2007-004

Wissenschaftszentrum Berlin
für Sozialforschung (WZB)

Mai 2007

Bei der Präsidentin
Emeriti Projekte

* Lecture at the 12th Japanese – German Symposium: „A Universal Challenge: Climate Change",
May 12, 2007 in Bamberg, Residenzschloss

Contents

Abstract

The “Kyoto Protocol”, as the first and only implementation mechanism under the UN Framework Convention on Climate Change (UNFCCC), will expire by the year 2012. There are, however, many good reasons not to abandon this multilateral approach to climate change, but to soon go for a new round – “Kyoto II”.

In doing so, the treaty must be thoroughly scrutinized for its deficiencies, as regards targets, instruments, and institutions. Particularly, and for various reasons, the Kyoto Protocol which is predominantly an economic concept should be supplemented by a technological companion - the “Houston Protocol” - under the UN Climate Convention.

This paper shows how such an innovative “double strategy” of future climate policy might look like.

“Climate change threatens the basic elements of life for people around the world – access to water, food production, health, and use of land and the environment”.

Sir Nicholas Stern

1 Climate Change and Climate Policy

The symposium addresses a real challenge – climate change – which needs compelling answers – climate policy. When writing the manuscript, the timing of this lecture seemed to be just perfect: roughly seven month after the publication of the German version of the 30-Year Update of “Limits to Growth” (September 2006), six months after the presentation of the “Stern-Report” (30th October, 2006), thirteen weeks after the presentation of the first part of the 4th Assessment of the Intergovernmental Panel on Climate Change (2nd February, 2007), five weeks after the second part (6th April, 2007) – and just one week before the third and last part (3rd May, 2007)!

Meadows et al. made it clear, that climate change is just one of those limits the world has already overshot; Stern et al. presented a dramatic estimation of the economic costs of climate change; Working Group I of the IPCC reported on the scope of climate change, and Working Group II on the impacts and vulnerabilities. And now, with the report of Working Group III, we will be told what can be done to address the problem – i.e., what policies can or should be used to adapt to climate change and to prevent dangerous climate change.

What was not foreseeable for the organisers of this conference was whether or not my views on climate politics would be in harmony or in conflict with the views of the IPCC. Well, there is probably both: consent and rejection.

2 Climate Change 2007: Physical Science Basis

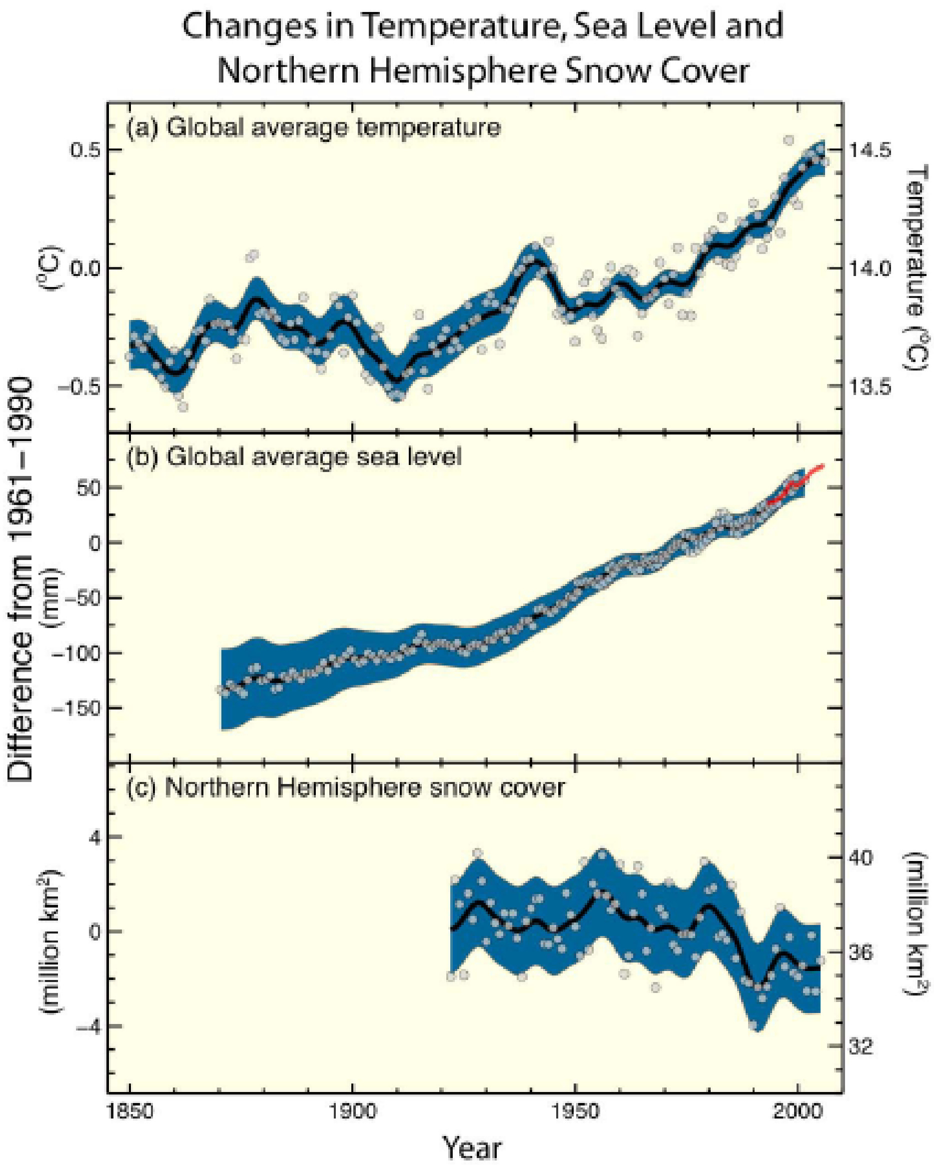
Let’s start with some basic facts. The 3rd IPCC Assessment Report of 2001 already set the tone; the 4th Report of 2007 strengthens it with ‘very high confidence’: “Warming of the climate system is unequivocal”.

The updated 100-year linear trend (1906-2005) is at plus 0.74 °C. The warming trend over the last 50 years is nearly twice that of the last 100 years. Eleven of the last twelve years rank among the 12 warmest years in the instrumental record of global surface temperature, since 1850.

Observations (continuously since 1961) show that the average temperature of the global ocean has also increased, to depths of at least 3000 meters. Such warming causes seawater to expand, contributing (with ‘high confidence’) to sea level rise for the total 20th century of some 17 cm.

At continental, regional, and ocean basin scales, numerous specific long-term changes in climate have been observed. These include changes in Arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones, of typhoons and hurricanes.

Figure 1: Changes in Temperature, Sea Level and Snow Cover, 1850 - 2000



Source: IPCC, WG I, 2007.

Changes in the atmospheric abundance of greenhouse gases and aerosols, in solar radiation and in land surface properties alter the energy balance of the climate system. These changes are expressed in units of "radiative forcing" - a term used to compare how a range of human and natural factors drive warming or cooling influences on global climate. In recent years, new observations and related computer-modelling have led to improvements in the quantitative estimates of such radiative forcing.

The report of Working Group I of IPCC says that by far the largest part of global warming is ('very likely') caused by human activities, particularly by the emission of various greenhouse gases.

Carbon dioxide (CO_2) is the most important greenhouse gas. Its global atmospheric concentration has increased from a pre-industrial value of about 280 ppm (parts per million) to 379 ppm in 2005. This exceeds by far the natural range over the last 650.000 years, as determined from ice cores.

The increased atmospheric concentration of CO_2 results primarily from fossil fuel use, with land use change providing another significant but smaller contribution. Between 2000 and 2005, annual fossil fuel carbon dioxide emissions have increased to 26,4 Gigatons, while emissions associated with land-use change (agriculture and deforestation) were in the order of 5,9 Gt CO_2.

The second most important greenhouse gas is methane (CH_4) which has increased from a pre-industrial value of about 715 ppb (parts per billion) to 1774 ppb in 2005. It is 'very likely' that the observed increase in methane concentration is due to anthropogenic activities, predominantly agriculture and fossil fuel use.

There is, third, nitrous oxide (NOx), the atmospheric concentration of which has increased from a pre-industrial value of about 270 ppb to 319 ppb in

2005. More than a third of all nitrous oxide emissions are anthropogenic, and primarily due to agricultural activities.

Analysis of climate models together with evidence from observations enables an assessed range to be given to “climate sensitivity”. Equilibrium climate sensitivity is defined as the global average surface warming following a doubling of carbon dioxide concentrations. Regarding a doubling from a pre-industrial level of 280 ppm to a future 560 ppm level, it is ‘likely’ to be in the range of 2 to 4,5 °C, with a best estimate of **3 °C**. The amount of further warming thus is dependent on the assumptions made about future emissions of greenhouse gases.

It is here, where the specific IPCC scenario methodology comes in. Model simulations cover a wide range of possible futures, including idealised emission and/or concentration assumptions.

Working Group I of IPCC presents six such scenarios (based on the IPCC Special Report on Emission Scenarios – SRES): three scenarios of category A1 – i.e., the fossil-intensive A1FI, the non-fossil energy sources A1T, and a balance across all sources A1B - and the scenarios A2, B1 and B2 – corresponding to CO_2 equivalent concentrations of 600, 700, 800, 850, 1250 and 1550 ppm, respectively.

(Scenarios B1 (600 ppm), A1B (850 ppm) and A2 (1250 ppm) have been the focus of model inter-comparison studies, and many of those results are assessed in the IPCC report).

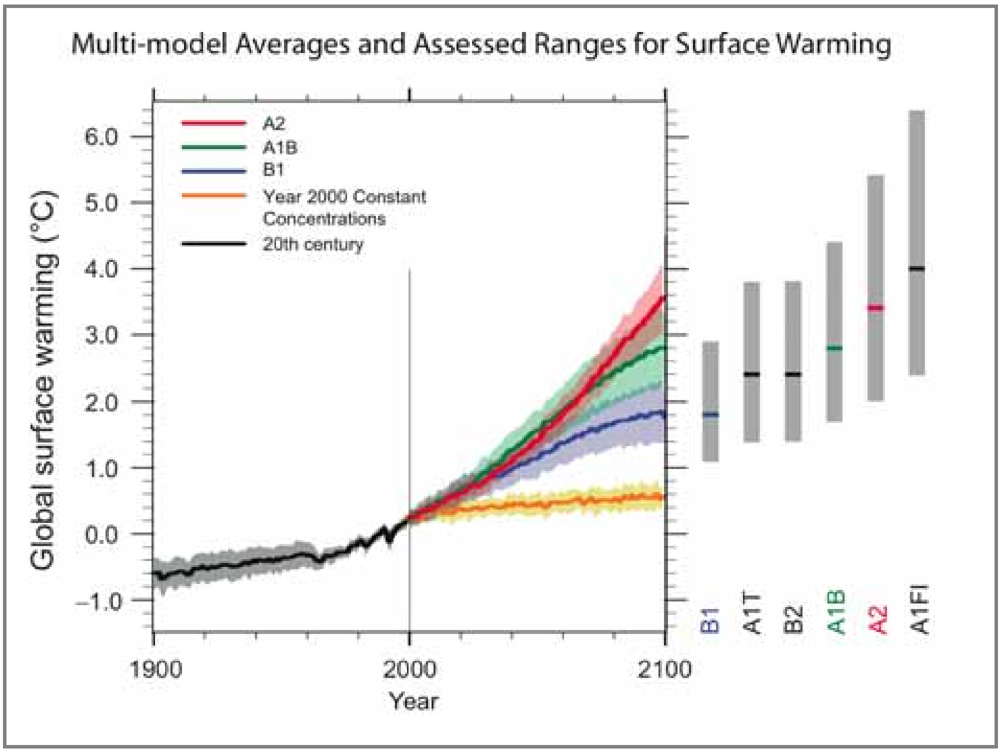
It’s interesting to note that the SRES scenarios do not include additional climate policy initiatives, which means that no scenarios are included that explicitly assume implementation of the UN Framework Convention on Climate Change (UNFCCC) or of the emission targets of the Kyoto Protocol.

What then are the results of the simulations? Depending upon the scenario taken, the range of further global warming up to the year 2100 (over 2000) is between **1.1** and **6.4 °C**.

The best estimate for the low scenario (B1) is **1.8 °C** (likely range is 1.1 – 2.9 °C). This scenario describes a world with increasing population that peaks in mid-century and declines thereafter, with rapid change in economic structures, reductions in material intensity, and introduction of clean and resource efficient technologies.

The best estimate for the high scenario (A1FI) is **4.0 °C** (likely range is 2.4 – 6.4 °C). This scenario describes a world of very rapid economic growth, where the path of using fossil fuels is not being abandoned.

Figure 2: Global averages of surface warming (relative to 1980-1999) for scenarios A2, A1B and B1



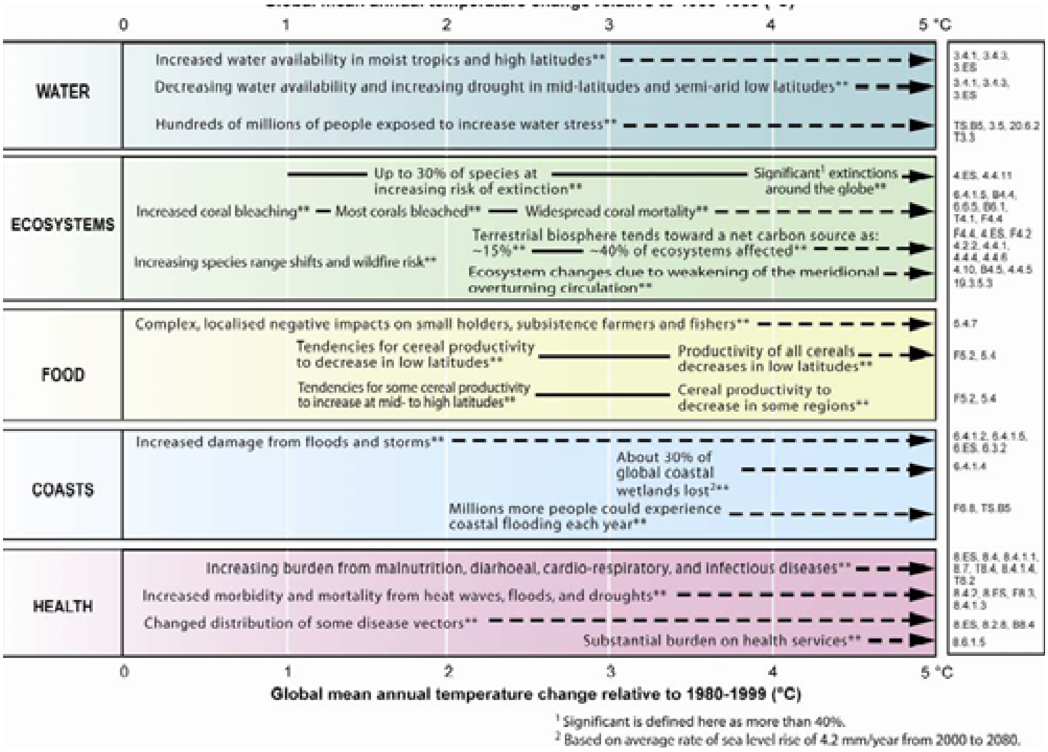
Source: IPCC, WG I, 2007.

3 Climate Change 2007: Impacts and Vulnerabilities

What then are the foreseeable impacts of climate change? Working Group II of IPCC relates its assessment on the results of Working Group I, especially on the more than 29,000 observational data series, from 75 studies, which show significant change in many physical and biological systems, a synthesis of studies and several modelling studies that have linked natural and anthropogenic factors. In this way, additional information on the possible future impacts of climate change emerged.

Working Group II presents the key findings regarding projected impacts in two major ways: with a view on sectors and a view on regions. Only an abridged version of the great number and the complexity of the impacts can be quoted and discussed here (see Figures 3 and 4).

Figure 3: Key Sectoral Impacts of Climate Change



Source: IPCC, WG II, 2007.

Figure 4: Detailed Examples of Major Impacts by Sector

Phenomenona and direction of trend	Likelihood of future trends	Examples of major projected impacts by sector			
		Agriculture, forestry and ecosystems	Water	Human health	Industry, settlements and society
Over most land areas, warmer and fewer cold days and nights, warmer and more frequent hot days and nights	Virtually certain	Increased yields in colder environments; decreased yields in warmer environments; increased insect outbreaks	Effects on water resources relying on snow melt; effects on some water supply	Reduced human mortality from decreased cold exposure	Reduced energy demand for heating; increased demand for cooling; reduced disruption to transport due to snow, ice; effects on winter tourism
Warm spells/heat waves. Frequency increases over most land areas	Very likely	Reduced yields in warmer regions due to heat stress; wild fire danger increase	Increased water demand; water quality problems, e.g., algal blooms	Increased risk of heat-related mortality, esp. for the elderly, chronically sick, very young and socially isolated	Reduction in quality of life for people in warm areas without appropriate housing; impacts on elderly, very young and poor.
Heavy precipitation events. Frequency increases over most areas	Very likely	Damage to crops; soil erosion, inability to cultivate land due to water logging of soils	Adverse effects on quality of surface and groundwater; contamination of water supply; water scarcity may be relieved	Increased risk of deaths, injuries, infectious, respiratory and skin diseases	Disruption of settlements, commerce, transport and societies due to flooding; pressureson infrastructures; loss of property
Area affected by drought increases	Likely	Land degradation, lower yields/crop damage and failure; increased livestock deaths; increased risk of wildfire	More widespread water stress	Increased risk of food and water shortage; increased risk of malnutrition; increased risk of water- and food-borne diseases	Water shortages for settlements, industry and societies; reduced hydropower generation; potential for population migration

Intense tropical cyclone activity increases	Likely	Damage to crops; windthrow (uprooting) of trees; damage to coral reefs	Power outages cause disruption of public water supply	Increased risk of deaths, injuries, water- and foodborne diseases; post-traumatic stress disorders	Disruption by flood and high winds; withdrawal of risk coverage by private insurers, potential for migration, loss of property
Increased incidence of extreme high sea level (excludes tsunamis)	Likely	Salinisation of irrigation water, estuaries and freshwater systems	Decreased freshwater availability due to saltwater intrusion	Increased risk of deaths and injuries by drowning in floods; migrationrelated health effects	Costs of coastal protection vs. costs of land-use relocation; potential for movement of populations and damage to infrastructure

Source: IPCC, WG II, 2007.

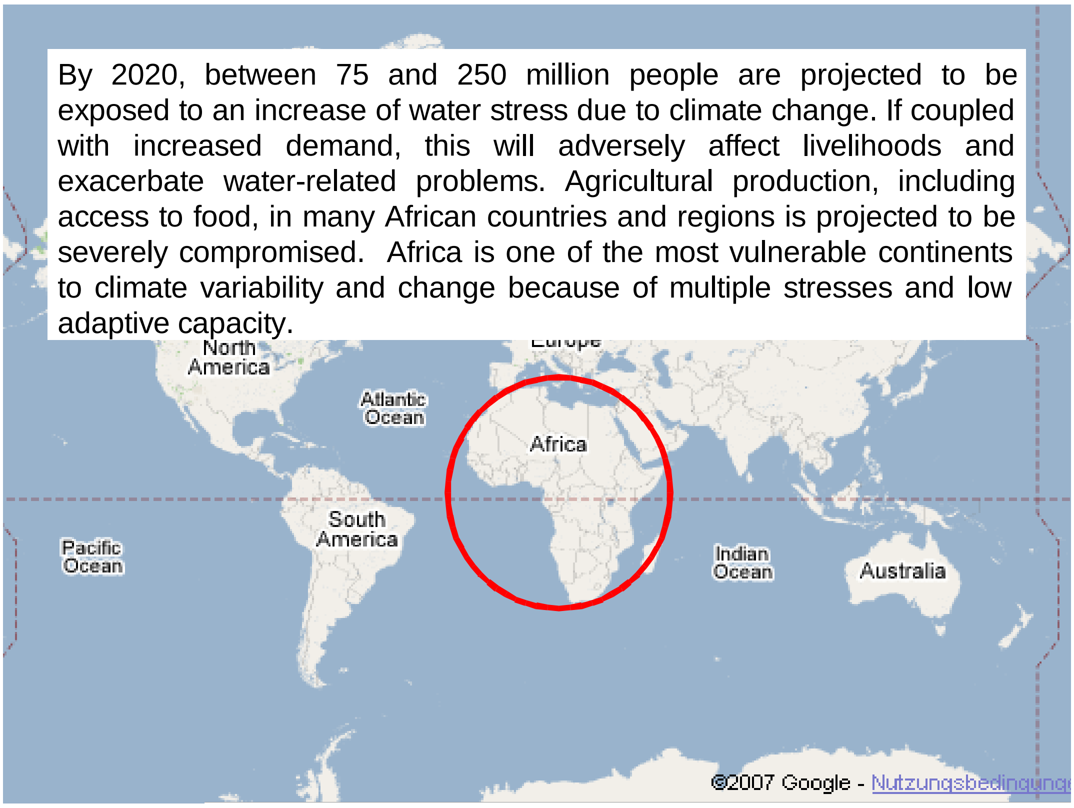
Working Group II of IPCC is sure that the magnitudes of impacts can now be estimated more systematically for a range of possible increases in global average temperature. Whether or not such magnitudes of impacts could be associated with “key vulnerabilities”, however, is left open.

In the literature, a number of criteria have been discussed - such as timing, persistence, distributional aspects such as justice and fairness - that make a respective judgement possible. Such information could become politically relevant in the future as it would help decision-makers in their responses to the specific risks (priority setting) of climate change.

At this point in time, the regional impacts of climate change find the special interest of the Working Group.

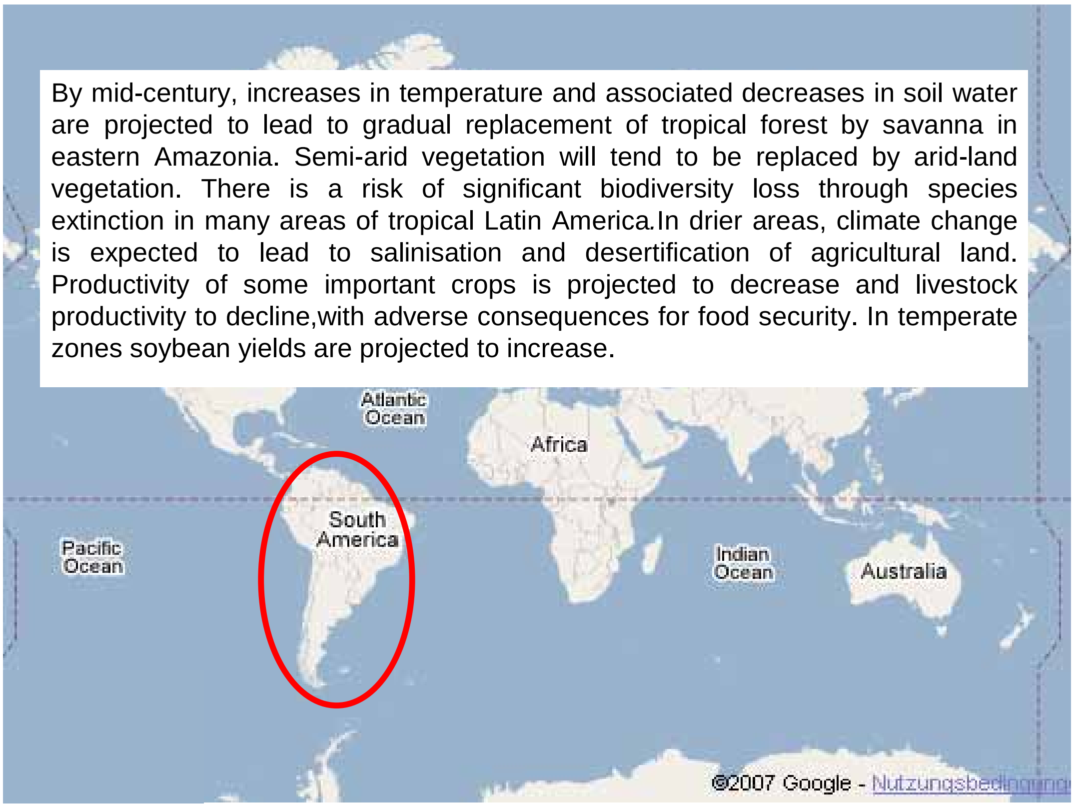
In the following, some short regional overviews shall be presented (see Figures 5 to 11).

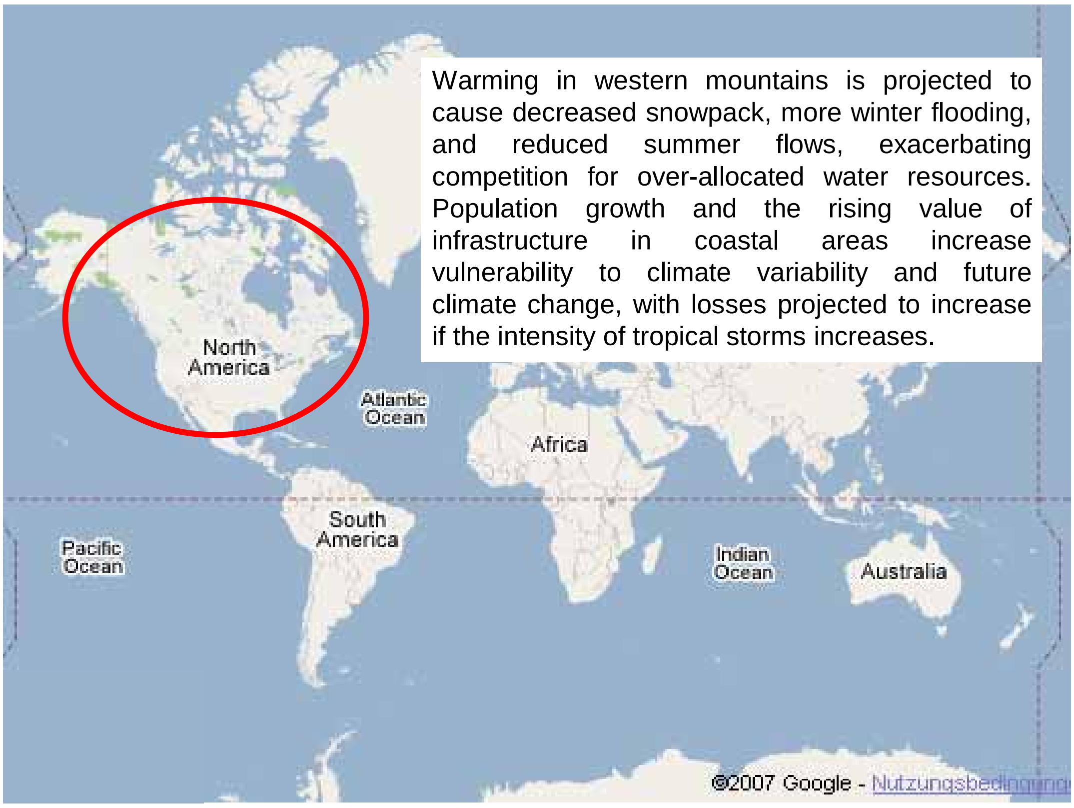
Figures 5 to 11: Regional Impacts of Climate Change

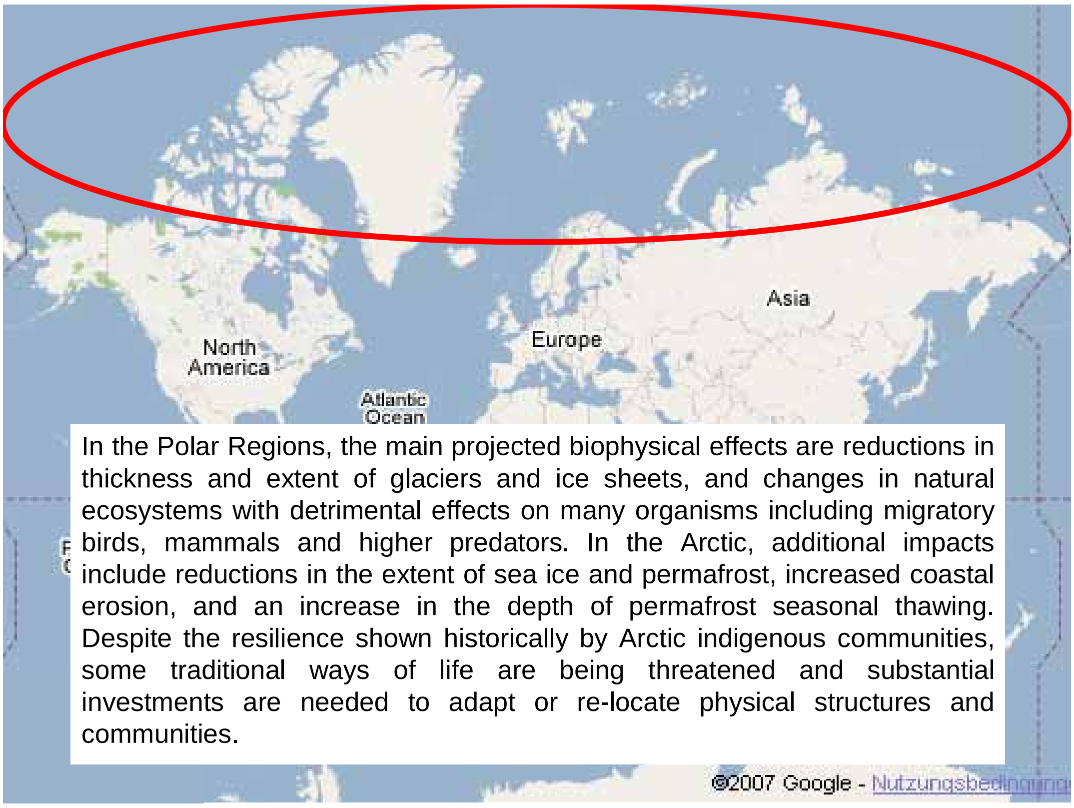


Nearly all European regions are anticipated to be negatively affected by some future impacts of climate change and these will pose challenges to many economic sectors. Negative impacts will include increased risk of inland flash floods, and more frequent coastal flooding and increased erosion. The great majority of organisms and ecosystems will have difficulties adapting to climate change. Mountainous areas will face glacier retreat, reduced snow cover and winter tourism, and extensive species losses.

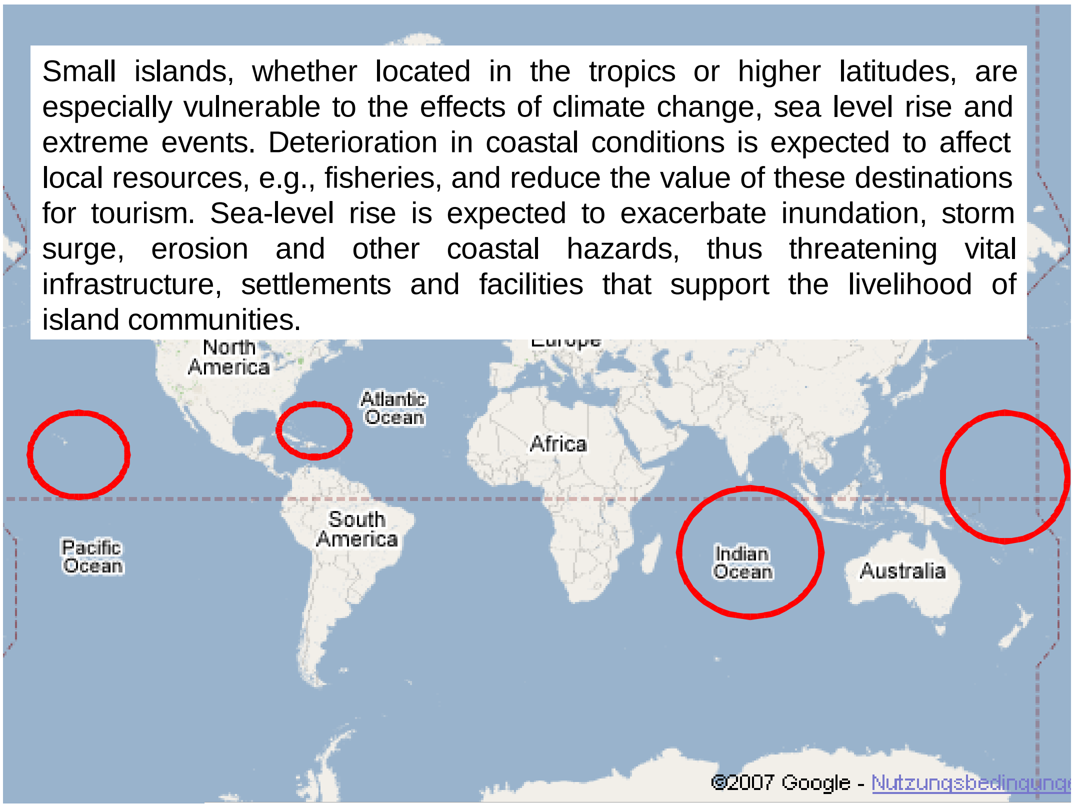
By mid-century, increases in temperature and associated decreases in soil water are projected to lead to gradual replacement of tropical forest by savanna in eastern Amazonia. Semi-arid vegetation will tend to be replaced by arid-land vegetation. There is a risk of significant biodiversity loss through species extinction in many areas of tropical Latin America. In drier areas, climate change is expected to lead to salinisation and desertification of agricultural land. Productivity of some important crops is projected to decrease and livestock productivity to decline, with adverse consequences for food security. In temperate zones soybean yields are projected to increase.




Warming in western mountains is projected to cause decreased snowpack, more winter flooding, and reduced summer flows, exacerbating competition for over-allocated water resources. Population growth and the rising value of infrastructure in coastal areas increase vulnerability to climate variability and future climate change, with losses projected to increase if the intensity of tropical storms increases.
North America
Atlantic Ocean
Africa
South America
Pacific Ocean
Indian Ocean
Australia
©2007 Google - Nutzungsbedingungen



In the Polar Regions, the main projected biophysical effects are reductions in thickness and extent of glaciers and ice sheets, and changes in natural ecosystems with detrimental effects on many organisms including migratory birds, mammals and higher predators. In the Arctic, additional impacts include reductions in the extent of sea ice and permafrost, increased coastal erosion, and an increase in the depth of permafrost seasonal thawing. Despite the resilience shown historically by Arctic indigenous communities, some traditional ways of life are being threatened and substantial investments are needed to adapt or re-locate physical structures and communities.



Source: Own compilations.

4 On the Costs of Climate Change

Adaptation to occurring climate change or mitigation, i.e., measures to reduce GHG emissions and to prevent dangerous climate change? This is not only a major issue for natural scientists. It is also an issue for economists and social scientists. With great vigour and expertise, Sir Nicholas Stern and colleagues have tried to answer two major questions:

1. What impacts will future greenhouse gas emissions have and what will they cost?

2. What are the costs and benefits of measures to reduce emissions of greenhouse gases?

To determine the impacts of climate change in economic terms is - as the authors rightly observe - a “real challenge”. Monetary evaluations of such heterogeneous and long-term changes are compound with a huge number of methodological and ethical questions. How to evaluate, for instance, the increased number of deaths and injuries when addressing climate change? What are the costs and benefits today, compared with those in the year 2100? The discount-rate plays a major role to determine these estimations.

It would certainly be worthwhile to discuss the Stern-Report in great detail. This, however, is not possible here. Instead, I shall heroicly assume that the issues of evaluation are known to the audience. Also, the results of the Stern-Report can only be summarised shortly:

1. The overall economic costs of climate change will be equivalent to losing at least **5 %** of global gross domestic product (GDP), now and for ever.

2. Taking the impacts on ecosystems and human health into consideration leads to a dimension of **11 %**.

3. Additionally considering possible feed backs and regional transfers due to differing impacts, the estimates of damage rise to **20 %** of global GDP, or more.

The costs of an unrestrained climate change thus may be on a scale of 5 to 20 % of gross global product – according to Stern probably at the upper end.

(To illustrate this dimension, Stern uses a comparison with the costs of the two world wars and the world economic crisis of the 1920s).

The alternative to these huge damages of climate change are, of course, the costs of action, i.e. those measures with which the emission of greenhouse gases could be reduced to avoid the worst impacts of climate change.

Two assumptions play a major role here: (1) The absorption capacity of the natural ecosystems is estimated at 5 $GtCO_2$ per year. (2) To stabilise the CO_2 concentration in the atmosphere at 450 ppm, the further increase of emissions would have to be stopped within the next 10 years, and reduced thereafter by 5 % annually; this, according to Stern et al. seems to be already out of reach. For a stabilisation at 550 ppm, this rate would have to be in the range of 1 to 3 % annually. Weak action in the next 10-20 years would put stabilisation even at 550 ppm beyond reach.

Four groups of measures are discussed to attain these goals:

1. Reducing demand for energy-intensive products and services;
2. drastic increase of energy efficiency;
3. curbing deforestation;
4. transition from fossil to non-fossil energy sources.

Stern et al. found that the costs for stabilisation of CO_2-concentration in the atmosphere at 500 - 550 ppm were centered on 1 % of global GDP by 2050.

Conclusion: The costs of an effective climate policy are much less than the costs of non-action. And: The later a strong climate policy is enforced, the more costly it will become.

The second part of the Stern-Report addresses the question of what kind of policies may best initiate the necessary paradigm shift. Three essential elements of a future climate policy are being discussed in detail: carbon pricing, technology policy, and removal of barriers to behavioural change. More specifically:

1. CO_2 emissions must have a price – be it through emissions trading, emission taxes or regulatory arrangements.

2. CO_2-free technologies of energy generation must be stimulated to reach competitive status, both in supply and in prises.

3. Restrictive behaviour patterns must be removed, particularly by introducing high energy efficiency standards, information on excessive energy consumption and possibilities of better energy use.

These elements of the Stern-Report already indicate that climate policy, in actual fact, is global policy. Strong collective action is needed, and should start right now. With this understanding, we have reached the final theme, namely to look at “Kyoto I” and “Kyoto II”.

Kyoto I (1997 / 2005 – 2008 / 2012)

Target:

- **Reduction of Greenhouse Gases by 35 States (and EU) by 5,2 % (over 1990)**

Economic Mechanisms:

- **JI: Joint Implementation**
- **CDM: Clean Development Mechanism**
- **ET: Emissions Trading (regional)**

Compliance:

- **Relative Sanction on Missing Target**

Incentives:

- **Global Environment Fund (GEF); Special Climate Fund;**
- **Adaptation Fund; LDC- Fund**

Source: Own compilation.

5 From Kyoto I to Kyoto II (III)

The "Kyoto Protocol" of 1997 which came into force in 2005, so far is the only implementation instrument under the UN-Framework Convention on

Climate Change. It will end in the year 2012. Therefore, time has come, to negotiate Kyoto II, and to reflect on Kyoto III.

To start with, the Kyoto Protocol is an extremely important treaty under international law, addressing the reduction of six specified greenhouse gases. There is no real alternative to a multi-lateral approach of climate policy. Also, the Kyoto Protocol is a treaty with highly innovative economic mechanisms. At the same time, however, it is, in its present form, a rather weak treaty.

This so for three major reasons: (1) The target is not very ambitious; (2) not enough actors (states) have been incorporated; (3) the sanctions against misbehaviour are insufficient.

Between signing (1997) and coming into force (2005), another structural deficit of the Kyoto Protocol was overcome, but only partly so. There still is no adequate balance between incentives and sanctions - between “the carrot and the stick”. Learning from the “Montreal Protocol”, where such balance was struck in an exemplary fashion, did not take place.

But to be honest: The CDM mechanism which is operating since about two years has led to some 1.200 emission reduction projects between industrial and developing countries, with a potential for emission reduction of some 1.5 billion tons of CO_2 until the year 2012. The JI-mechanism which is in effect since several months has a reduction potential of a few hundred million tons. The potential of the ET-mechanism is theoretically enormous, depending however on strict, politically set caps (emission limits) and the actual emission certificate price – which in reality can be high or low.

The various climate funds established in recent years may be sufficient to cover information and communication costs. But for effectively addressing adaptation to climate change and mitigation of dangerous emission levels, they are absolutely insufficient.

All these mechanisms of the Kyoto Protocol therefore need re-adjustment. The CDM has nearly no effect in Africa, but is booming in China. The JI needs an efficiency philosophy which so far does not exist in most of the countries involved (particularly Eastern Europe). The ET mechanism established in Europe is poorly conceptualised, and there is none yet in the regions of Northern America or Eastern Asia.

In addition, there is the question whether the economic mechanisms of the Kyoto Protocol need not be amended. In their steering functions, all national policies depend on different strategic instruments. There is no reason why this should not also hold true for international climate policy.

In the literature on global environmental problems, quantity solutions (like emission certificates) and price solutions (like taxes and levies) are basically treated as being equivalent. And regarding price solutions, the proposals are many: levies on the use of global public goods (air and sea transport), a general CO_2 tax, etc. However, what is theoretically advisable, and practically required, is often confronted by particular interests. And so the question is, whether an updated classic (Meadows et al.), a fascinating film (Al Gore), a comprehensive report (Stern et al.) and a cool assessment (IPCC) will really make a difference.

This said, we have already touched the essentials for a “Kyoto II”: (1) The targets must be heightened; (2) the number of actors enlarged; (3) the mechanisms augmented; (4) the sanctions tightened; (5) the incentives amplified.

Hereby, an important question is whether a consensus can be reached on a concrete warming target. The German Advisory Council on Global Change (WBGU) first proposed a strict upper limit of 2°C of temperature increase (which corresponds to a CO_2-concentration of about 450 ppm); others meanwhile have joined. The basic rationale of this proposal: A global average warming of above 2°C can only be described as being “dangerous”.

With “Kyoto II” we mean a new implementation treaty to the UN-Framework Convention on Climate Change (UNFCCC) for the time from 2012 onwards. To be honest, this treaty may not be signed in Kyoto (Japan), after all. Depending on the outcome of current diplomatic initiatives by the Danes, it might be signed at the Conference of the Parties (COP) to the Convention in Copenhagen (Denmark) in 2009. In addition to this possible milestone of future climate policy there is, as was said earlier, the question of the perspectives for the time after 2020/25 and up to 2050 (“Kyoto III”), the period on which climate policy concepts must be focussed, as climate science is anyway.

Annotation

At this point, a commentary must be given. The UN-Framework Convention on Climate Change and the Kyoto Protocol symbolise, in essence, a technical path to climate protection - or the “Energy Option”. Targets, instruments and strategy are focussed in a peculiar way on energy related greenhouse gas emissions. The climate system, however, is also influenced by changes in other natural systems, particularly vegetation, forests, and water. Therefore, it is necessary and adequate to also address the natural path to climate protection – especially the “Forest Option”, i.e. the conservation of forests, sustainable forest management, reforestation and afforestation. This option however is excluded from the present argumentation, as it was addressed earlier by the author in a special paper (Simonis, 2007).

Kyoto II / III (2012 – 2020/25 – 2050)

Target:

- **Reduction of Greenhouse Gases by 35 + (!) States (and EU) by 25/30 % - 50 %**

Additional Economic Mechanisms:

- **Levy on the Use of Global Goods (like Air Transport, Sea Transport)**
- **General CO_2-Tax**
- **Global Emissions Trading**

Compliance:

- **Decarbonisation-Standards; Absolute Sanction on Missing Target**

Incentives:

- **ET- or Tax-based Climate Fund**

Source: Own compilation.

6 Formulating a Technology Protocol

Seen physically, the Kyoto Protocol ("Kyoto I, II, III") is mainly on decarbonisation, more precisely: on formulating and implementing certain international decarbonisation standards. The Earth system, however, is not only endangered by CO_2 emissions. The industrial metabolism as such is exorbitantly high, particularly material throughput; and with it the “Ecological Rucksack” of industrial society.

For instance, the CO_2 burden of the average European is above 9 tons per year, but the total material throughput (TMT) is nearly 70 tons. Therefore, mitigation via “low emission technology” should be supplemented by mitigation via “resource-light economy”. Dematerialisation is also asked for – or, as a recent proverb says: “Less horsepower, more IQ!”.

Here, a number of strategic technological mechanisms or mitigation portfolios come into picture, of which quite a few are addressed in the report of Working Group III of IPCC. Key mitigation technologies and practices could be the following ones:

- The three **e’s**: Energy Saving; Energy Efficiency; Renewable Energies;
- the three **r’s**: Reduce; Re-use; recycle;
- the big **s**: CO_2-sequestration;
- the basic **ie**: Industrial ecology.

Quite a few of those who mistrust or even refuse multi-lateral approaches to climate change and international law – and with it the Kyoto Protocol – play the “technology card”, propose so called lighthouse projects, an ‘Apollo program’ or strategic innovation policy – like hydrogen economy, CO_2-sequestration or large-scale renewable energies. An offer should be made to these actors and interest groups, especially when in this way a new and dynamic cooperation on international climate protection technology would emerge.

Basically, the UN-Framework Convention on Climate Change (UNFCCC) allows more than just one implementation protocol. That means, it is neither necessary nor particularly clever to base international climate policy on just one market oriented protocol – the Kyoto Protocol. A technology oriented protocol could also and additionally be conceptualised under the UN-Climate Convention. This, preferably, should be done where major opponents to the Kyoto Protocol can be located – for instance, in Houston, Texas.

'Houston-Protocol' (2012 – 2020/25 – 2050)

Target:

- **Low Emission Technology; Resource-light Economy**

Technological Mechanisms:

- **3 e's: Energy Saving; Energy Efficiency; Renewable Energies**
- **3 r's: Reduce; Re-use; Recycle**
- **Big s: CO2-Sequestration**
- **Great ie: Industrial Ecology**

Compliance:

- **Dematerialisation-Standards; ‚Front-Runner' Principle;**
- **'Zero-Emission' Principle**

Incentives:

- **Technology Transfers; PPPs; Factor- 4, Factor-10-Funds**

Source: Own compilation.

With such a “double strategy” - improving the Kyoto Protocol (“Kyoto II”) and formulating a Technology Protocol (“Houston Protocol”) - two goals could be achieved at the same time: getting in the so far opposing or boycotting parties, and making national “free-riders” responsible for international action.

Regarding the sanction and incentive mechanisms of such an international technology treaty, basic principles could be introduced which have proven to be technologically innovative, the “front-runner” and the “zero-emission principle”, for instance, and the “Factor 4-” and the “Factor 10-concept”. In addition, special consideration should be given to a flexible handling of patent law, which otherwise could prevent the breakthrough towards international climate technology cooperation.

7 Last but not least: Institutional Innovations

There is another great idea that could be important for our topic. Parallel to the presentation of the first part of the 4th IPCC assessment report on 2nd February, 2007, the French President had invited to an environment conference in Paris. In a glowing speech, Jacques Chirac was pleading for a revolution – a revolution of consciousness, of the economy, and of political action (la revolution des consciences; la revolution de l’economie; la revolution de l’action politique). “Planet Earth suffers”, the President said. “But why do we hesitate to take action? It is that we refuse, due to guilty egoism, to accept the consequences of environmental destruction.”

A great institutional reform could come close to such revolution of political action: the transformation of the rather weak and poorly endowed United Nations Environment Programme (UNEP) into a powerful Global Environment Organisation (GEO) - or a World Environment and Development Organisation (WEDO).

Global Institutional Reform

Cooperation:

- **UN-Conventions (Climate, Biodiversity, Deserts, Chemicals)**

Addition:

- **UN-Soils-, Water- and Forest Conventions**
-

Integration:

- **UNEP (+) >>> GEO**
- **UNEP (+) >>> WEDO**

Source: Own compilation.

This, indeed, could be a strategically important innovation. Not only for future international climate policy. Also, the coordination of the other sectoral policies is in need of better institutionalisation within the UN-system. The conservation of biodiversity, of forests, the protection of soils, the safeguard of water resources – all these global tasks are influenced by climate change and are in a feed-back loop with this change. Using cooperation, addition and integration to come to a coherent global environmental policy ("*Weltumweltpolitik*" - Simonis) therefore seems to be a major political task of the future.

Institutional reform, based on fairness and equity, is not only important for saving the climate system. It is also necessary because of the fact that the short-term economic interests must be balanced with the long-term ecological interests. This, however, is impossible as long as there is a World Bank (WB) and a World Trade Organisation (WTO), but no World Environment Organisation (GEO/WEDO).

Parity – it seems – is the minimum that must be achieved. Especially, if Sir Nicholas Stern is right in saying that "climate change is the greatest market failure the world has ever seen".

International climate policy needs a new dynamics. It needs front-runners and after-burners. It needs progress without taking notice of possible profiteers of decline. This seems possible if all major actors –governments, business, academia, and civil society – not only accept the reality of climate change, but also the responsibility for it.

8 Literature

German Advisory Council on Global Change (WBGU): New Impetus for Climate Policy: Making the Most of Germany’s Dual Presidency. Policy Paper 5, Berlin 2007.

Intergovernmental Panel on Climate Change (IPCC): Climate Change 2001, Cambridge 2001.

IPCC (Working Group I): Climate Change 2007: The Physical Science Basis, Geneva 2007.

IPCC (Working Group II): Climate Change 2007: Impacts, Adaptation and Vulnerability, Geneva 2007.

Meadows, Donella, Jorgen Randers, Dennis Meadows: Grenzen des Wachstums. Das 30-Jahre-Update, Stuttgart 2006.

Rahmstorf, Stefan, Hans Joachim Schellnhuber: Der Klimawandel. Diagnose, Prognose, Therapie, München 2006.

Roberts, J. Timmons, Bradley C. Parks: A Climate of Injustice, Cambridge, Mass., London 2007.

Simonis, Udo E. et al.: Weltumweltpolitik. Grundriss und Bausteine eines neuen Politikfeldes. 2nd. edition, Berlin 1999.

Simonis, Udo E.: Energieoption und Waldoption, in: Solarzeitalter, Vol. 19, No. 1, 2007,pp. 39-46.

Stern, Nicholas et al.: The Economics of Climate Change, London 2006.