


Knowledge for Climate

State of the art on the Legal and Policy Literature on Adaptation to Climate Change:

Towards a research agenda




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Towards a research agenda

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Samenvatting

Er bestaat aanzienlijk minder juridische, dan economische, politicologische en andere wetenschappelijke literatuur over klimaatverandering. Dit gegeven vloeit voort uit de gewoonte van veel juristen om zich eerder bezig te houden met belangrijke conceptuele vragen binnen het rechtssysteem dan met multidisciplinaire studies inzake het milieu. Voorzover er door juristen aandacht is besteed aan het klimaatvraagstuk is die met name gericht op mitigatie. Pas recent ziet men aandacht voor adaptatievraagstukken in de juridische literatuur, ondanks dat zowel het Klimaatverdrag als het Kyotoprotocol aandacht schenken aan adaptatie. De internationale verdragen richten zich echter in het bijzonder op de adaptatieopgave van ontwikkelingslanden en de rol die de ontwikkelde landen daarbij zouden kunnen en moeten spelen. Op dit moment dringt het besef door dat ook op nationaal Nederlands niveau een klimaatadaptatiestrategie moet worden ontwikkeld. Dit rapport beoogt hier een bijdrage aan te leveren vanuit een juridisch perspectief.
Dit rapport beschrijft de juridische vragen die voortvloeien uit het internationale klimaatregime, de belangrijkste juridische concepten zoals het 'no-harm-principle', het 'ability-to-pay-principle' en de ontwikkeling die men waarneemt richting een mensenrecht met betrekking to klimaatverandering.
Vervolgens worden de belangrijkste concepten besproken die spelen op het Europese en nationale niveau, waar zich in belangrijke mate dezelfde vragen voordoen als op het internationale niveau, zoals het belang van beginselen en van wat men noemt een 'rights-based approach'. In het bijzonder wordt aandacht geschonken aan de noodzakelijke duidelijkheid over de verdeling van verantwoordelijkheden, zowel tussen verschillende overheden als tussen de overheid en private partijen. Onduidelijk is of het Europese en nationale recht het nemen van adaptatiemaatregelen belemmeren en of specifieke noodwetgeving snelle adaptatiemaatregelen mogelijk maakt. Tevens komt de betekenis van het aansprakelijkheidsrecht aan de orde, waarbij aandacht wordt besteed aan zowel de overheidsaansprakelijkheid als aan de aansprakelijkheid van private partijen.

Dit rapport mondt uit in vijf gebieden waar de komende jaren juridisch onderzoek nodig is om een goede klimaatadaptatiestrategie te kunnen ontwikkelen:

1. Voor alle niveaus – mondiaal, Europees en nationaal – dient onderzocht te worden hoe de mensenrechten, beginselen, een rechtvaardige verdeling van lusten en lasten, normstelling, beleid, plannen, instrumenten, aansprakelijkheid, geschillenbeslechting, ontwikkelingssamenwerking en noodhulp concreet moet worden vormgegeven. Een belangrijke onderzoeksvraag betreft de verhouding tussen de behoefte aan flexibiliteit enerzijds en de behoefte aan rechtszekerheid en rechtstatelijkheid anderzijds.
2. Voorts wordt – eveneens voor alle niveaus - de verdere ontwikkeling van het (internationale) aansprakelijkheidsrecht, compensatieverplichtingen, het recht op ontwikkeling en de vormgeving van de instituties die nodig zijn voor het ontwikkelinen van een klimaatadaptatiestragie als een belangrijke uitdaging gezien.
3. Op Europees niveau dient de meerwaarde van Europese regelgeving onderzocht te worden en tevens de vraag op welke beleidsterreinen eventuele nieuwe regelgeving noodzakelijk kan zijn. Alsook de bevoegdheden van de EU met betrekking tot niet-lidstaten om een Europese adaptatiestrategie te ontwikkelen en om een leidende rol in het klimaatdebat te kunnen belijven spelen.
4. Op het nationale niveau wordt aanbevolen onderzoek te doen naar de noodzakelijke juridische instrumenten om infrastructuur klimaatbestendig te maken of te houden. Voorts verdient de vraag aandacht hoe klimaatbestendigheid een rol kan spelen in de besluitvorming op het terrein van de ruimtelijke ordening en het waterbeheer.
5. Ten slotte wordt aanbevolen onderzoek te doen naar het juiste schaalniveau en de juiste juridische maatregelen bij klimaatadaptiemaatregelen.

Summary

There is less legal literature on the climate change regime than there is on economic, political and other disciplinary studies on the issue of climate change. This reflects the general focus of mainstream legal scholars to focus on the key conceptual challenges in law rather than engage in multidisciplinary studies of environmental law. On the other hand, in the legal literature, relatively more attention has been devoted to mitigation than to adaptation over the years, and adaptation is only now emerging on the legal agenda.
Even though the Climate Change Convention and the Kyoto Protocol do devote some attention to adaptation issues, the focus has been on the adaptation challenges of developing countries and the role of the developed countries in meeting them.
Against this background, this document examines the specific legal issues that arise from the international legal process and documents, some of the key concepts that are important such as the no-harm principle, the ability-to-pay principle, and the evolving notion of a human right with regard to climate change. It then discusses key legal issues at the European Union and national level and focuses on the need for clarity regarding how responsibilities should be divided between the different levels of governance and between government and private actors. Do EU and national regulations stand in the way of adaptive measures, or do emergency law provisions allow for proactive state action when necessary? How will issues regarding liability by the state to its citizens and others be determined?

Finally the report identifies five promising areas of legal research for the coming years:

1. In respect of legal challenges at local through to global levels of governance, how can the notions of human rights, equity, liability, standard setting, policies, plans and instruments, conflict resolution, development cooperation, and emergency assistance be given concrete form? How can the development of such a strategy be made consistent with principles of democracy, legitimacy and the rule of law? Will there be friction between the need for flexibility and the need for predictability?
2. In respect of legal challenges at the global, European and national level, how can the concepts of international liability, compensation and the right to development; as well as the institutions for implementing adaptation be further developed?
3. In respect of legal challenges at European Union level, what is the added value of legal measures at EU level, and on which sectors should it focus? To what extent can the EU and the European Commission take retaliatory measures against non-EU countries to protect their interests in the area of adaptation?
4. In respect of legal challenges at national level, what legal instruments are necessary to make existing infrastructure climate-proof in the Netherlands? How do and can competing claims for spatial planning and water take into account the impacts of climate change?
5. In respect of questions on an administrative scale, which types of adaptation measures call for legal intervention and at which level of governance?

1. Introduction

Adaptation in the area of climate change is becoming a serious issue as the impacts of climate change are probably already being experienced in many parts of the world (IPCC, 2007a). While it is still difficult to separate climate variability from climate change, and issues of attribution remain contentious (IPCC, 2007a), it is clear that many of the current day impacts are clearly in line with the projected impacts of climate models (IPCC, 2007a & 2007b). These serious impacts include the rapid melting of the glaciers and polar ice caps, changes in precipitation patterns and a rise in sea level (IPCC, 2007b). Dealing with the impacts of climate change and climatic variability have to be integrated and action on adaptive measures can no longer be postponed (Stern, 2006). The costs of coping with the impacts of climate change are likely to be significantly higher than the costs of reducing the rise of greenhouse gas emissions (Stern, 2006).

At the same time, the adaptation issue has received relatively little priority in the political and legal sphere over the last twenty years and, as such, there has been relatively little research carried out (Gupta, 2007). Only recently has interest in adaptation research exploded and such work is now scratching the surface of what needs to be done. However, most of the adaptation research work is conceptual and practical in nature and very little has actually been undertaken in the legal field (see 2).

Against this background, this document seeks to address the question: What is the current state of the art on adaptation law literature? What are the gaps in the literature? What research questions still need to be addressed?

Adaptation governance is a multi-disciplinary issue covering economics, politics, law, management science, anthropology and political geography. This document focuses on the legal and political literature but does not exclude other sources of relevant material. In doing so, it looks at policy and legal documents, including case law. It also systematically looks at the literature. Legal research questions are often characterised as general and it may seem that they do not specifically address questions related to adaptation to climate change. It must be said beforehand that especially in the climate change debate these general legal questions – like questions concerning principles, equity, the rule of law and a fair distribution of burdens and profits – play an important role due to the fact that climate change needs solutions that both ask for flexibility on the one hand and legal certainty and legal protection on the other. The result of how governments deal with these – sometimes – conflicting goals are of extreme relevance for the implementation strategy in daily practice, like this will be done in the eight hot spots. Insufficient attention for these questions may lead to severe delays and a strong reluctance among stakeholders. Financial arrangements which do not comply with legal demands, such as the cost recovery principle of the EC Water Framework Directive, may lead to unwelcome surprises.

This report is structured as follows. It first examines the key issues with respect to adaptation in the international climate change regime, in particular the relevant decisions on adaptation, and draws relevant questions from this material (Chapter 2). It then undertakes a review of the legal literature on international law issues that are of relevance to adaptation (Chapter 3). The following chapter examines key issue at the European Union level and national level, since there is a close relationship between legal institutions at these two levels (Chapter 4). The assessment closes by extracting key research questions that flow from the research (Chapter 5).

2. Adaptation in the international climate change regime

2.1 Introduction

Adaptation has been covered in the formal climate change regime, and these elements are briefly dealt with below (see 2.2).

2.2 The climate treaties and decisions taken

The Climate Change Convention

The legally binding obligations of countries with respect to adaptation to climate change have their basis in the United Nations Framework Convention on Climate Change, 1992. The no-harm principle is acknowledged in the preamble to the Convention as:

Recalling also that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction, (Preambular Para 8; emphasis mine).

Nevertheless, in an attempt to frame the Convention along the leadership paradigm and principle (Art. 3.1; 4.2a) rather than the liability paradigm, the Convention reflects the compromise agreements between countries. The Convention does not define adaptation, but does define impacts which are referred to as the adverse effects of climate change – and defined as "changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare" (Art 1.1).

Although the preamble also emphasises that:

Acknowledging that change in the Earth's climate and its adverse effects are a common concern of humankind (Preambular para 1), adaptation is given less direct importance in the Convention than mitigation, and the Convention makes no explicit links between emissions and adaptation and avoids the liability issue. Bodansky (1993: 528) explains "adaptation measures generate primarily local benefits, so that developed countries have little incentive to fund adaptation measures". Instead, the Convention couches the issue in terms of "leadership" and "common but differentiated responsibility" (Gupta 1998). Nevertheless, the Convention refers 22 times to 'effects' and 'adverse effects' and 7 times to 'vulnerability' and 'impacts'. Sands (1992: 272) argues that this might reflect an implicit objective "of establishing a vehicle to ensure that countries, particularly those most vulnerable, are able to prepare adequately for adaptation."

The Convention emphasises a number of issues with respect to adaptation:

- Adaptation and its link to mitigation:
  - Efforts to mitigate greenhouse gas emissions must be commensurate with the ability of ecosystems to adapt naturally; not threaten food production and enable economic development to proceed in a sustainable manner (Art. 2).
  - Precautionary measures to deal with climate change should be cost-effective but should take also adaptation into account (Art 3.3).
- Principles regarding responsibilities
  - All Parties must cooperate on the basis of the common but differentiated responsibility and respective capabilities principle (Art. 3.1).
  - The specific needs of developing countries including those most vulnerable and with a disproportionate burden must be taken into account (Art. 3.2).
  - The precautionary principle also implies that policies and measures should also take into account adaptation (Art. 3.3).
- General cooperation on adaptation
  - All Parties must cooperate in formulating, implementing and reporting on measures, including adaptation to the adverse impacts of climate change (art. 4.1b).
  - All Parties must integrate climate change considerations into their policies on, inter alia, adaptation (Art. 4.1f)
- Articles on raising financial resources
  - All Annex II Parties shall provide new and additional finances for agreed full costs incurred by developing countries in fulfilling Article 12.1 (on communicating national policies) and shall also assist financially on measures in Art. 4.1 (on developing and

implementing policies including on adaptation) subject to agreements made and in accordance with appropriate burden sharing (Art. 4.3).
    - Annex II Parties shall assist particularly vulnerable developing countries to meet the costs of adaptation (Art. 4.4)
    - A negative formulation of the same text: The implementation by developing countries will be dependent on the implementation by the developed countries with respect to financial resources (Art. 4.7)
    - All Parties shall give full consideration to actions related to funding, insurance and the transfer of technologies to meet the specific needs and concerns of developing country parties arising from the adverse impacts of climate change (Art. 4.8).
- Articles on disbursing assistance:
    - An interim financial mechanism for the "provision of financial resources on a grant or concession basis" was established under Art.11. Although the Article did not limit the funding to emission reductions; in effect, in the first several years of the GEF very little money was disbursed for adaptation.
- Articles on classifying recipients:
    - Several articles emphasise that the following groups of countries should be given special attention - Particularly vulnerable countries (3.1), Countries with a disproportionate or abnormal burden (3.1); For vulnerable countries particularly in Africa, affected by drought and desertification, as well as floods (Art. 4.1e).; Assistance for "particularly vulnerable developing countries" (Art 4.4); And countries like (a) Small island countries; (b) Countries with low-lying coastal areas; (c) ; Countries with arid and semi-arid areas, forested areas and areas liable to forest decay; (d) Countries with areas prone to natural disasters; (e) Countries with areas liable to drought and desertification; (f) Countries with areas of high urban atmospheric pollution; (g) Countries with areas with fragile ecosystems, including mountainous ecosystems; (h) Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products; and (i) Land-locked and transit countries (Art. 4.8); Least developed countries (Art. 4.9).
    - In addition, the preambular paragraphs refer to other international legal documents such as General Assembly resolution 44/206 of 22 December 1989 on the possible adverse effects of sea-level rise on islands and coastal areas, particularly low-lying coastal areas and the pertinent provisions of General Assembly resolution 44/172 of 19 December 1989 on the implementation of the Plan of Action to Combat Desertification. These documents connect the global climate change problem and the vulnerability of some countries to its impacts. Even though the word 'adaptation' is not explicitly mentioned, it is implied in these documents.
- Furthermore, at the first meeting of the Conference of the Parties (COP) in 1995, a process was launched to identify vulnerable countries; but decisions regarding how adaptation could be financed were delayed. The lack of willingness to support adaptation measures led to the birth of the concept of 'autonomous adaptation', *i.e.* people and environment will adapt by themselves; thus hoping that the problem will solve itself. However, although autonomous adaptation plays a significant part in the literature, it is becoming clear that proactive and reactive planned adaptation must have a large part to play if the impacts of climate change are to be mitigated to some extent.

The Kyoto Protocol

Article 2.3 of the Kyoto Protocol states that "the Parties included in Annex I shall strive to implement policies and measures … in such a way as to minimize adverse effects, including the adverse effects of climate change…on other Parties, especially developing country Parties and in particular those identified in Article 4…of the Convention." The Kyoto Protocol calls on developing countries to adopt measures to mitigate emissions and adapt to climate change and specifically recommends both adaptation technologies and spatial planning (Article 10b). Furthermore, the Kyoto Protocol of 1997 established an Adaptation Fund financed from a levy on the Clean Development Mechanism.

Conference of the Parties

At the COP in Nairobi in 2006, a Nairobi Work Plan was adopted for the period 2005-2010. The purpose of the plan was to assist all Parties but, and in particular, the least developed countries and the small island countries, to enhance understanding and assessment of impacts, vulnerability and adaptation to climate change and to help them make decisions as to how best respond to these impacts. In 2007, a comprehensive listing of activities was already undertaken under the supervision of the secretariat. These activities are consistent with the themes adopted in Decision 2/CP.11. They include methods and tools, data and observations, climate modelling, scenarios and downscaling, climate-related risks and extreme events, socio-economic information, adaptation planning and practices, research, technologies for adaptation, and economic diversification.

As of July 2008, 38 National Adaptation Plans of Action have been completed for the Least Developed Countries as a follow-up to Art. 4.9 of the Convention and Decisions 5/CP.7, Decision 28/CP.7 and Decision 29/CP.7. NAPAs provide a process for Least Developed Countries to identify priority activities that respond to their urgent and immediate needs with regard to adaptation to climate change.

A detailed guide (Decision 28/CP.7) on prioritising adaptation measures was developed for LDCs to help them in developing their NAPAs. The guidelines encourage synergies between adaptation actions and actions on other relevant processes, including conventions on biodiversity and desertification, sectoral policies, poverty reduction, sustainable development strategies, etc. It also offers a list of criteria to be used in a prioritisation exercise, and a list of fields in which these criteria can be applied. Related to the NAPA process, Decision 29/CP.7 set up an LDC Expert Group (LEG) to provide guidance and advice on the preparation and implementation strategy for NAPAs. A Local Coping Strategy Database has also been created to support countries in their understanding on impacts and adaptation.

Support for Adaptation funding has been based on the “common but differentiated responsibilities principle”. Countries finance the process on a voluntary basis. Although the Convention creates a legal basis in Articles 4.4, 4.8 and 4.9, very limited funding was offered until recently. The Global Environment Facility has recently set up a Trust Fund, which, inter alia, finances vulnerability and adaptation assessments. The Fund became operational in 2004 and had disbursed its funds as of 2005. In addition, there is a Least Developed Country Fund and a Special Climate Change Fund, all of which were established at the Marrakech Conference of the Parties. As mentioned above under Art. 12 of the Kyoto Protocol, an Adaptation Fund was established, and at Bali at COP-13 the Adaptation Fund Board was established; this fund became operational as of 2008.

The key decision of COP-13 was the Bali Action Plan.1 An assessment (Gupta 2008) shows that this Plan calls for deep cuts in emissions and launches a process for the post 2012 period which should also take adaptation, technology transfer and adaptation assistance into account. It also calls on the GEF to simplify the incremental cost principle and take lessons on Piloting an Operational Approach to Adaptation to improve access to funds. It decided that the Adaptation Fund would become operational in 2008 and set up an Adaptation Fund Board with 16 members which meets twice annually, a secretariat (GEF on an interim basis) and a trustee (The World Bank). The GEF was appointed as the secretariat despite opposition from the developing countries, and a compromise was found by setting up Bonn as the place for the meetings instead of Washington. The Adaptation Fund Board has several functions, including the development of strategic priorities for the COPs to adopt, operational policies and guidelines, criteria for project selection, and rules of procedure, monitoring and review of activities, the establishment of committees, panels and working groups as required and responsibility for the monetisation of certified emission reductions.2 Since its establishment in Bali, the Adaptation Fund Board has held three meetings in 2008 and the Board has approved and decided to forward to the CMP for its final approval:

Draft Rules of Procedure of the Adaptation Fund Board; Draft Legal Arrangements for the Adaptation Fund Secretariat, Draft Legal Arrangements between the CMP and the Adaptation Fund Trustee, Draft Strategic Priorities, Policies and Guidelines of the Adaptation Fund; Role and Responsibilities of the Adaptation Fund Board, Role and Responsibilities of the Adaptation Fund Secretariat, Roles and Responsibilities of the Implementing and Executing Entities, 2008 Work Plan of the Adaptation Fund Board, 2008 Budgets for the Adaptation Fund Board and Secretariat. On the monetisation of the Certified Emission Reductions (CER)s of the Adaptation Fund, the Board agreed to commence as early as practicable after an agreement has been finalised between CMP and the World Bank regarding the services to be provided by the Trustee to the Adaptation Fund. The expectation is that

[1] Bali Action Plan, available at http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf.

[2] CMP 3 Decision on Adaptation Fund, see http://unfccc.int/files/meetings/cop_13/application/pdf/cmp_af.pdf.

this would be in the first quarter of 2009. One of the immediate challenges facing the Board and the Fund is the availability of resources to support its work. There are significant costs associated with operationalising the fund. In addition, ensuring that transaction costs associated with making resources available to eligible Parties are kept to a minimum level while the fund is operationalising is another challenge.

2.3 Questions of critical importance

A quick analysis of the treaty reveals a number of questions:

a. To what extent have follow-up efforts to the treaty adequately linked impacts with the precautionary principle in order to elaborate on Article 2 of the Convention?
b. Is the adoption of the leadership concept, as opposed to the polluter pays or liability concepts, an effective way towards generating the resources needed for adaptation?
c. What is the extent of the legally binding commitments of the developed countries with respect to the provision of financial assistance for adaptation to the developing countries?
d. Is the delegation of responsibility to the Global Environment Facility in the area of adaptation justified? Has the GEF lived up to its legal commitments?
e. Have countries adequately reported on their commitments to take adaptation measures in their home country?
f. What legal grounds can underlie the division of recipient countries into different categories?
g. What legal principles can be developed to determine how the limited adaptation resources are to be shared between countries?

3. Literature review on International Legal Aspects

3.1 Introduction

This section elaborates on some basic definitions of impacts, adaptation and resilience, and then sums up some key elements of the literature on adaptation. It first discusses adaptation and the link to mitigation, principles relevant to adaptation, general cooperation on adaptation, the issue of raising financial resources, the issue of disbursing financial resources and the organisational framework for financial resources. Since, the resources are limited, it also discusses a framework for analysing the no-harm principle and current and proposed litigation in the area of climate change.

3.2 Impacts, adaptation and resilience: definitions

In the scientific literature that feeds the negotiation process, adaptation is defined as: “adjustments in ecological, social or economic systems in response to actual or expected stimuli and their effects or impacts. This term refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change” (IPCC WGII 2001).
Adaptive capacity is defined as “The general ability of institutions, systems, and individuals to adjust to potential damage, to take advantage of opportunities, or to cope with the consequences” (MA Glossary, MEA); and as “The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences” (IPCC WG II 2001, IPCC WGI 2007).
Resilience is the capacity of a system to experience disturbance and still maintain its ongoing functions and controls (Holling 2002); Sensitivity is defined as “The degree to which a system is affected, either adversely or beneficially, by climate-related stimuli.” “Vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. [It] is a function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.” (IPCC WGII 2001, IPCC WGII 2007).

3.3 IPCC Literature on adaptation

The Intergovernmental Panel on Climate Change has covered the literature on adaptation from the earliest IPCC reports, but not always systematically. The first IPCC report stressed that adaptation strategies include developing emergency and disaster preparedness policies and programmes and coastal zone and river basin management plans for areas at risk from sea level rise and changes in the hydrological cycle respectively and that the impacts would be disproportionately felt in the South (IPCC-III, 1990).
The second IPCC assessment report (1995) started by stating that it was not yet possible to link specific emissions with specific impacts, a key legal sticking point. It highlighted that the life support systems of the world will be impacted by climate change, mostly adversely but in some cases beneficially. It highlighted the uncertainties surrounding many of the impacts due to the lack of regional models and poor understanding of many important climate processes. Despite this, it forecast impacts on all major ecosystems with a particularly acute impact on coastal and aquatic ecosystems. For humans systems it highlighted the dangers of increased glacial melt, reduced agricultural yields, sea-level rise in coastal areas and the detrimental effect on human health. It briefly highlighted a number of potential adaptation strategies and pointed out the implementation problems in developing countries with weak institutions and poor access to investment markets.
The third assessment report (IPCC 2001) appeared much more focused on mitigation options than adaptation and noted that what was regarded as dangerous climate change varied by region and a country’s adaptive capacity. It stated that while some areas may initially benefit from climate change, that a continued increase in temperature would diminish any benefits. It also stated that while many adaptation options do exist, assessment of them was incomplete. The synergy between mitigation and adaptation options was raised here along with the equity and sustainable development dimensions.
The fourth assessment report (IPCC 2004) states that adaptation will reduce vulnerabilities in both the short and long term, that natural adaptation will not be enough to cope with the added vulnerabilities climate change brings, and that regardless of any mitigation measures in the next 20-30 years, adaptation will still be necessary. It states that adaptation measures, while starting to happen, are not enough at present, that many adaptation projects can be achieved at low cost or with high cost/benefit ratios and that the benefits are higher if implemented sooner. Finally it highlights the social, economic and development issues, how they form a barrier to adaptation in developing

countries, but also highlights that developed countries are not immune as was demonstrated by the summer heat wave in Europe in 2003 and hurricane Katrina in the USA in 2005. The report highlighted a number of sectors, their planned adaptation options, the underlying policy framework and the barriers and opportunities facing implementation.

3.4 Status of legal discussions in the regime and relevant research work

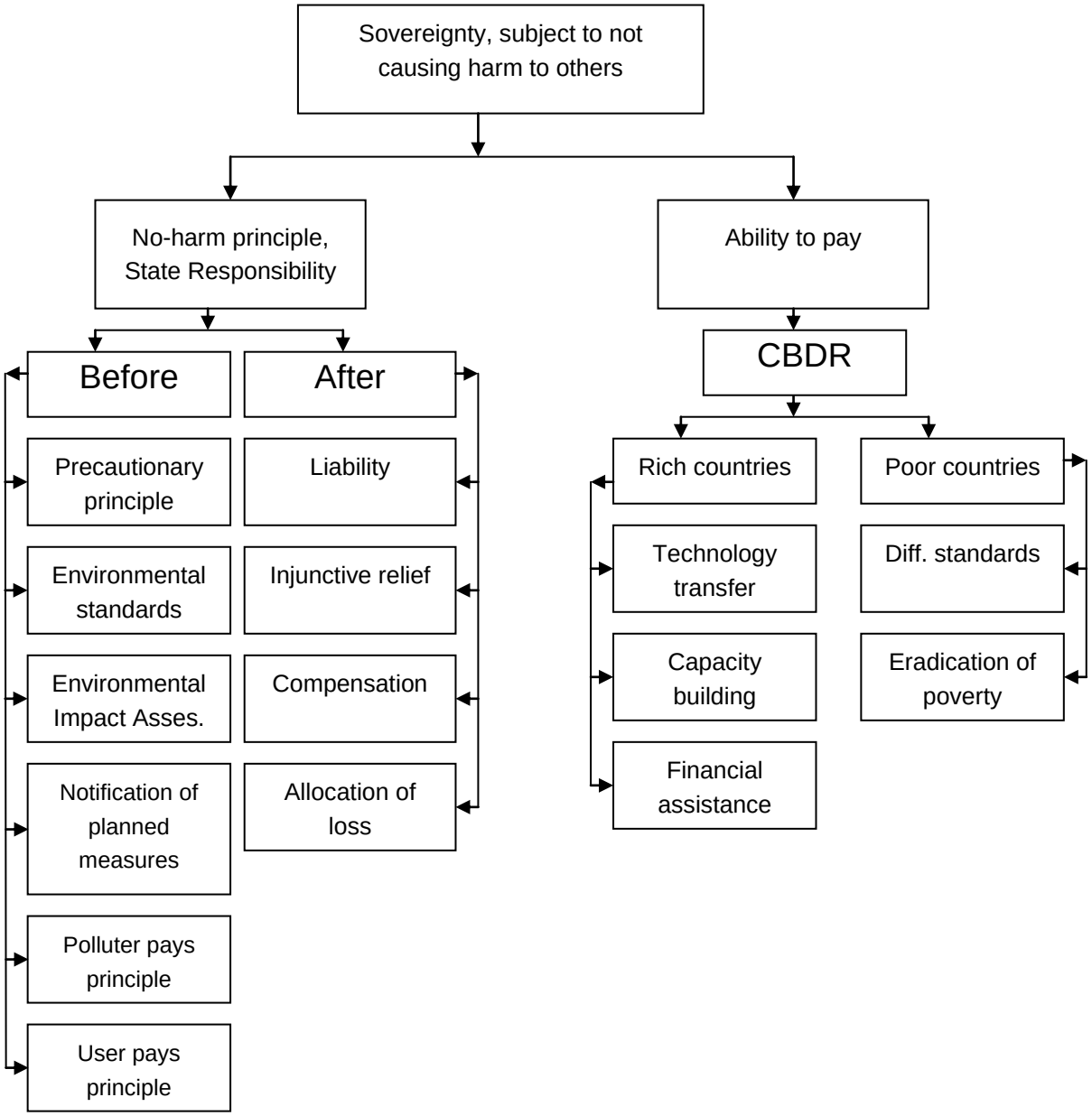
3.4.1 Introduction

This section briefly covers the international process and the literature relevant to the different themes. It discusses the principles and tools relevant to adaptation as well as the human rights principle.

3.4.2 Principles and relevance to adaptation

This section discusses the sovereignty principle in brief and then the principles that are relevant *before* harm is caused and the principles that are relevant *after* harm has been caused. It follows the scheme presented below.

Diagnosis of the No-Harm Principle in legal relations



3.4.3 The Sovereignty principle

The sovereignty principle was initially based on the Principle of Absolute Territorial Sovereignty which gives states the power to undertake any action with respect to the natural resources within their territory. This principle was very well developed in water law and was encapsulated in the Harmon doctrine. This argued that the US had unlimited territorial jurisdiction over the Rio Grande within its territory and that "the rules, principles and precedents of international law impose no liability or obligations upon the US" to share the water with Mexico, or pay damages for injury in Mexico caused by the diversions of water in the US.

However, as time passed, the notion of absolute territorial sovereignty was questioned by the creation of the Principle of Absolute Integrity of State Territory. This principle implies that each state has the right to ensure that no other country uses its resources in such a way as to change the physical integrity of the state. Oppenheim defines it as follows: "It is a rule of international law that no state is allowed to alter the natural conditions of its own territory to the disadvantage of the natural conditions of the territory of a neighbouring state" (cited in Berber 1959: p.21). This principle has been created more in relation to water law.

From these two principles evolved the Principle of Restricted Territorial Sovereignty. This principle implies that states can use their territory in whatever manner they wish, but they may not cause harm to other states. When transboundary environmental problems became important, the restricted territorial sovereignty principle led to the development of the Principle of Sovereignty Subject to Duty Towards Other States. This implied that states had complete control over their natural resources, but had the responsibility to ensure that they did not cause environmental harm to other states.

At Stockholm in 1972, the Declaration on the Human Environment stated that:

"States have in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction"

Stockholm Declaration 1972: Principle 21

This was restated at the United Nations Conference on Environment and Development in Rio in 1992, and is the effective norm in international environmental law. It is also included in the Preamble to the Convention on Climate Change.

3.4.4 Principles that are relevant prior to the occurrence of damage

Precautionary Principle

The precautionary principle focuses on due diligence and is included in many treaties including the Rio Declaration, the Climate Change Convention and the Biodiversity Convention. Promoted by the European Union (Gee & Vaz 2001), it has three characteristics – the potential threat of environmental damage, uncertainty in the underlying science, and the possibility of irreversible impacts (Trouwborst 2007). UNFCCC Article 3.3 notes that the Parties should take precautionary measures to anticipate, prevent or minimise the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. However, there are difficulties in interpreting this principle at present and legal systems and courts interpret this differently (Voigt 2008; and Birnie & Boyle 2002).

Environmental Standards and Legislation

The Rio Declaration imposes a responsibility on all nations to adopt effective environmental standards and legislation. As stated in Principle 11:

"States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and development context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries." (Rio Declaration, 1992). These have been adopted to varying extent in developed and developing countries and also with varying levels of effectiveness as often a good standard is rendered meaningless by the lack of capacity to enforce it.

Environmental Impact Assessment

Following the lead of the US and EU, several countries have made national environmental impact assessment legislation. The Rio Declaration also calls on states to do so. Since greenhouse gases may not be seen as pollutants, an EIA may not reveal the significance of such pollution. However,

Environment Canada has included CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6) in Schedule 1 of the Canadian Environmental Protection Act, 19993,4 and can now be regulated under Section 64 of the Act5 (Gupta 2006). The recent 2007 Supreme Court Decision of the US has also acknowledged CO_2 as a pollutant that can be regulated.

In a recent US case, Friends of the Earth, Greenpeace and the City of Boulder, Colorado litigated against the US Export-Import Bank and the Overseas Private Investment Corporation (OPIC) on the grounds that these agencies have financed projects with high greenhouse gas emissions worth US$32 billion in developing countries without assessing their environmental impacts.[6] In 2005, the judge ruled that even though OPIC had its own environmental procedures, this did not imply that it did not have to implement the National Environmental Protection Act.[7] The case has since been heard in the US District Court for the Northern District of California and a decision is pending.

Notification of Planned Measures

Notification of planned measures that may have extra-territorial effects is included in general principles (Rio Declaration 1991), in water law treaties (UN Watercourses Convention 1997; SADC Watercourses Convention 2000) and in Article 8 of the ILC Prevention of Transboundary Harm from Hazardous Activities 2001). These notification requirements informing other countries of planned activities and discussing with them on the basis of good faith whether such planned activities should be allowed or not and under what circumstances. This would imply that countries and companies that invest in large projects with extra territorial effects should inform such other parties of this.

Polluter Pays Principle

The polluter pays principle could imply that polluters (greenhouse gas emitters) need to pay for pollution prevention and control measures. Emerging from economic theory it essentially calls on polluters to deal with externalities by internalising the damage costs (Coase, 1960). In 1974, the OECD proposed that polluters should be obligated to pay for pollution prevention and control measures. In 1992 the Rio Declaration called on states to adopt the polluter pays principle in domestic law. Many developed countries oppose this principle in the international climate regime as they have been clearly identified as past polluters, while clearly many developing countries support it. The Brazilian proposal during the Kyoto Protocol negotiations applies this principle and proposes a methodology for linking industrialised countries' contribution to emission control with their contribution to global warming. In this way, historical emissions are included in sharing the burden of emissions control. (U.N. Doc. FCCC AGBM/1997/MISC.1/Add.3, 3.). This proposal is still on the agenda and the Subsidiary Body for Technological and Scientific Advice (SBSTA) has sponsored continued research into contributions to climate change. See U.N. Doc. FCCC/SBSTA/2002/INF.14 for a summary of the research efforts carried out by various institutions, while up-to-date information is available at http://www.match -info.net/. According to the polluter pays principle, whoever causes pollution should be held accountable for that pollution, through possible internalisation of the associated costs. This is seen as just and has thus been included in law and policy processes. The polluter is seen as the party that causes harm and has thus a responsibility to correct that wrong. Where the polluting activity is illegal, there are clearer legal actions that can be taken. Where the polluting activity is not in itself illegal, the issues are more complicated. Although this principle is adopted in national and OECD law it has not been effectively used in international law. In some bilateral and multilateral incidents the principle has only partially been applied. For example, the 1976 Rhine Chloride Convention allocates the costs of pollution abatement between the polluters (66 per cent) and the victim (34 per cent).

The polluter pays principle has been implicitly applied in the climate change regime. Article 17 of the Kyoto Protocol speaks of emissions rights trading among "Annex B" countries and emissions trading is one of the economic/market based tools to put the polluter pays principle into practice, specially in

[3] Canadian Environmental Protection Act, 1999, S.C. (1999), c. 33.

[4] Order Adding Toxic Substances to Schedule 1 to the Canadian Environmental Protection Act, 1999, 139:36 *Canada Gazette Part I* (3 September 2005), 2880.

[5] See Environment Canada, 'Toxic Substances List - Updated Schedule 1 as of November 30, 2005' (Environment Canada, 2005), available at <http://www.ec.gc.ca/CEPARegistry/subs_list/Toxicupdate.cfm>. See also 'Fact Sheet: Greenhouse Gases, Climate Change and the Canadian Environmental Protection Act, 1999' (16 July 2005), found at <http://www.ec.gc.ca/press/2005/050716-2_b_e.htm>

[6] *Friends of the Earth, Greenpeace, Inc. and City of Boulder Colorado v. Overseas Private Investment Corporation, Export-Import Bank of the United States*, filed in the US District Court for the Northern District of California (26 August 2002).

[7] See Order Denying Defendants' Motion for Summary Judgment, in *Friends of the Earth, Greenpeace, Inc. and City of Boulder Colorado v. Peter Watson (Overseas Private Investment Corporation) and Phillip Lerrill (Export-Import Bank of the United States)* (2002), 35 Envtl. L. Rep. 20, 179.

the international arena. However, some experts argue that this principle is difficult to apply to climate change because of the complicated transboundary and intergenerational character of the problem and because it rarely takes historical emissions or equity considerations into account (Tol and Verheyen, 2004). There is nothing however to limit the development of this principle in this direction however.

3.4.5 Principles that are relevant after the occurrence of damage

Liability, Injunctive relief, compensation and allocation of loss principle

Liability for harm caused to others is a principle of national and international law. In recent years it is increasingly being included in treaties, especially with respect to operators of hazardous activities. The table below sums up some of these provisions. The European Community has sometimes used the polluter pays principle to justify strict liability. Examples include the 1993 EC Green Paper on remedying environmental damage, the 2000 EC White Paper on Environmental Liability and the proposal for a Council Directive on Civil Liability caused by Waste.

Treaty	Parties	In Force	Brief description
International Convention on Civil Liability for Oil Pollution Damage, 1969; Replaced by 1992 Protocol as amended in 2000		19-6-75 1-11-2003	The Civil Liability Convention covers those who suffer oil pollution damage resulting from maritime casualties involving oil-carrying ships. The Convention places the liability for such damage on the owner of the ship from which the polluting oil escaped or was discharged.
Convention Relation to Civil Liability in the Field of Maritime Carriage of Nuclear Material, 1971	17	15-7-75	Convention is to resolve difficulties and conflicts which arise from the simultaneous application to nuclear damage of certain maritime conventions dealing with ship-owners' liability, as well as other conventions which place liability arising from nuclear incidents on the operators of the nuclear installations from which or to which the material in question was being transported. The 1971 Convention provides that a person otherwise liable for damage caused in a nuclear incident shall be exonerated for liability if the operator of the nuclear installation is also liable for such damage by virtue of the Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy; or the Vienna Convention of 21 May 1963 on Civil Liability for Nuclear Damage; or national law which is similar in the scope of protection given to the persons who suffer damage.
International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971; replaced by 1992 Protocol	102	30-5-96	The 1992 Protocol established a separate, 1992 International Oil Pollution Compensation Fund, known as the 1992 Fund, which is managed in London by a Secretariat, as with the 1971 Fund. In practice, the Director of the 1971 Fund is currently also the Director of the 1992 Fund.
Athens Convention Relation to the Carriage of Passengers and their Luggage by Sea, 1974	32	28-4-87	The Convention establishes a regime of liability for damage suffered by passengers carried on a seagoing vessel. It declares a carrier liable for damage or loss suffered by a passenger if the incident causing the damage occurred in the course of the carriage and was due to the fault or negligence of the carrier.
Convention on Limitation of Liability for Maritime Claims, 1976	50	1-12-86	The Convention covers liability of ships for two types of claims - claims for loss of life or personal injury, and property claims (such as damage to other ships, property or harbour works).
International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), 1996	11	-	The HNS Convention is based on the two-tier system established under the CLC and Fund Conventions. However, it goes further in that it covers not only pollution damage but also the risks of fire and explosion, including loss of life or personal injury as well as loss of or damage to property. The Convention introduces strict liability for the ship-owner and a system of compulsory insurance and insurance certificates. The HNS Convention excludes **pollution damage** as defined in the International Convention on Civil Liability

			for Oil Pollution Damage and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, to avoid an overlap with these Conventions.
International Convention on Civil Liability for Bunker Oils Pollution Damage 2001	22	21-11-08	The Convention was adopted to ensure that adequate, prompt, and effective compensation is available to persons who suffer damage caused by spills of oil, when carried as fuel in ships' bunkers. The Convention applies to damage caused on the territory, including the territorial sea, and in exclusive economic zones of States Parties.
Nairobi International Convention on the Removal of Wrecks, 2007	-	-	To remove shipwrecks that cause damage to humans and ecosystems; not yet in force
On fresh waters			
Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters 1997	ECE countries		Liability and compensation
On dangerous substances			
Lugano Convention 1993			strict liability for damage caused by dangerous activities or substances (defined broadly – Art.2.); participation in financial security scheme such as an insurance (art. 12)

Allocation of Loss principle

The UN's International Law Commission proposes an 'Allocation of loss' principle, which focuses on harm caused by acts that do not contravene international law based on its work since 1978. This is included in the 2006 '*Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising out of Hazardous Activities*'.

The principle aims to guide states on a "prompt and adequate" compensation scheme for transboundary harm (Principle 4) and guarantee compensation to victims. As Foster (2005: 271) explains, the principles do not oblige states to compensate: they only "ensure that compensation is paid" and "the role of states is to make sure this happens". The principles further establish that states should fulfil this duty by imposing liability on operators within their borders, i.e. those private parties that conduct the injurious activities. States are compelled to introduce requirements that ensure the operator "to establish and maintain financial security … to cover claims of compensation" (Principle 4(3)) through inter alia, insurance, bonds and industry-wide funds. Principle 4(5) states that if all the preceding measures fail to provide sufficient compensation, the state should allocate additional financing to make sure the victims are compensated.

The Trail Smelter case is, according to Birnie & Boyle (2002), the only case where compensation was granted through international environmental law. Most international compensation claims are dealt with through civil liability at the national level.

Challenges in implementing this principle include the issue of causality especially with respect to climate change (Voigt 2008: 15); and the allocation of responsibility between different polluters (Birnie & Boyle 2002). Tol & Verheyen (2004), point to the 1992 Nauru case where Nauru was not obliged to confront all possible parties but was allowed to bring a claim against one of them.

Foster (2005) submits that there are two weaknesses – first on who defines risk and whether it is objectively defined and second whether one must first exhaust civil claims at the level of the state before turning to this international compensation scheme.

While the polluter pays principle is based in economic principle, the allocation of loss is based in legal principles. While the allocation of loss principle may tend to focus too much on compensation from the

polluter rather than equitable redress to the victim (Foster 2005), this focus should not be lost (Cullet 2007). However, the European Directive on Environmental Liability may allow companies to state that they had a permit to pollute as they worked in accordance with national standards and this might limit their liability (Faure and Nollkaemper's 2007: 156).
A key question is whether the existence of a specific treaty reduces obligations under general customary law. Voigt (2008) argues that though the UNFCCC and its Kyoto Protocol exist, the lack of clear obligations in the treaty could be used to argue that customary international law still holds. Tol and Verheyen (2004) argue that the state be held liable for activities permitted by the state if there are negative impacts elsewhere. Furthermore, Article 2 imposes a duty on states to not cause harm to others (cf. Voigt 2008, Tol & Verheyen 2004, Verheyen 2002, Barnett & Adger 2003) and may imply that allowing greenhouse gas emissions is a wrongful act.
In terms of the ability to pay principle, a number of concepts are important and are discussed below:

The common but differentiated responsibility principle
Principle 7 of the Rio Declaration states that:
"States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit to sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command." (Rio Declaration, 1992)
This acknowledges the differing responsibilities with respect to causing climate change and therefore the different responsibilities to deal with it, enshrining an asymmetric burden sharing. The principle of CBDR was also restated as part of the UNFCCC principles. This principle focuses on the differences between the rich and poor countries and emphasises that all countries have common responsibilities with respect to the problem but that action needs to be differentiated on the basis of their contribution to the problem and their capabilities. This principle emerges out of the need to take diverging circumstances into account. While there is considerable support in the literature for respecting this principle (Rajamani 2000, Anand 2004, Batruch 1988-89), Weisslitz (2005; cf. Adams 2003) submits that "the use of territorial variation as a justification for differential standards ignores the significant likelihood of transboundary harm and is therefore an insignificant approach". These counter arguments from mostly US lawyers (Gupta 2007) are reminiscent of Hardin's lifeboat economics ethic. But equal treatment of all may not imply equal outcomes and this makes equal treatment unfair (Shue 1999). However, clearly issues relating to fast developing countries like China and India need special consideration (Gupta 2007), but this does not negate the value of the principle with respect to the remaining 130 developing countries. Furthermore, Shue discusses flat or progressive rates as a way to operationalise the ability to pay principle.

Technology transfer, capacity building and financial assistance
Principle 9 of the Rio Declaration states that:
States should cooperate to strengthen endogenous capacity building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.
Further to this within the UNFCCC treaty further provision was made for these items in respect of adaptation, article 4.1(b) requires all nations to "facilitate adequate adaptation to climate change." And further in articles 4.3 and 4.4 which state that the developed countries will "provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations" and "also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects."

Differentiated responsibilities for developing countries to take action
As shown previously in Principle 11 of the Rio Declaration it is clearly stated that although all states should adopt environmental regulations, "Environmental standards, management objectives and priorities should reflect the environmental and development context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries" (Principle 11). This allows for poor countries to do less because of more pressing priorities such as development and poverty reduction and also due to the additional constraints they face in taking action such as lack of capacity and resources.

3.4.6 Raising and disbursing financial resources

Adaptation and adaptation funding, has been controversial, as few developed countries wished to see this in the light of the liability and compensation debate. Early on, adaptation was seen as a national issue, while emission reduction was seen as an international issue (Gupta 1997). Since it was seen as a national issue, the need to fund this through international mechanisms was not regarded as necessary (Bodansky 2003). With the passage of time only certain preparatory measures (Stage III measures) to adaptation became eligible for funding from GEF, since GEF funds are earmarked for 'global environmental benefits' and not local benefits (Gupta 1995; Mace 2005). In response to developing country demands, the Kyoto Protocol set up three new funds: the Special Climate Change Fund (SCCF), the Least Developed Countries Fund (LDCF); and the Adaptation Fund which became operational in 2008. The proliferation of funds does not imply proliferation of resources (Mohner and Klein 2007) as funds fall far short of the World Bank estimates of USD 10-40 billion and Oxfam estimates of 50 billion (OXFAM 2007). The prospects for the Adaptation Fund look quite good as it is funded from the proceeds of the Clean Development Mechanism and this is set to grow rapidly. But many countries feel that the most vulnerable may not receive resources (speech Tuvalu 2007) and the GEF as the funding body remains controversial (see Gupta 2008; Sopoga et al. 2007). Some have suggested that instead, a stand-alone governing body would be better suitable to administer the Adaptation Fund.

Although there is a proliferation of funds, the resources remain limited. Research on raising resources includes applying the adaptation levy on all market mechanisms to reduce greenhouse gases (Gupta 1998); a tax on shipping and air travel (Muller and Hepburn 2006; Oberthur 2006); contributions to an insurance fund (Bals et al. 2006). Some suggest that countries with income above USD 10,000 per capita make 0.3% of GNI available for climate assistance (Gupta 2007) and develop principles which should be used as a basis for raising funds (Muller et al. 2003; Gardiner 2004; Bouwer and Aerts 2007).

3.4.7 Organizational framework

Status in the legal arena: Much of the adaptation resources are channelled through the Global Environment Facility. One of the most controversial issues at Bali was the role of the GEF and the World Bank in the Adaptation Fund. Consensus was ultimately found by asserting that meetings of the Board would take place in Bonn, even if the secretariat activities were undertaken by the GEF in New York and that applications for funding would be directed at the Board and not via one of the implementing agencies of the GEF.

However, only 3 (France, Switzerland and Poland) of the 12 developed country members participated in the September 2008 meeting (http://www.adaptation-fund.org/images/List_of_Particiapnts_AFB.3.rev.pdf). and there appear to be a number of new rumours going round about the willingness of developed countries to engage seriously in this Fund.

Mace (2005) discusses funding for adaptation and argues that Annex II parties that have ratified the Convention have committed to providing adaptation measures covered in Article 4 of the Convention. However, he concludes that the GEF Trust Fund "continues to lack a formal operational programme on adaptation within its climate change focal area" (2005: 245). In line with Gupta 1987, Mace argues that despite the fact that the Convention states that the COP should state how the GEF should disburse its climate funds, "interests outside the COP have played a substantial role in the criteria established for developing country access to the GEF Trust Fund, the LDC Fund and the SCCF's programming and pledging mechanisms, and the GEF's RAF's use of governance criteria to determine climate change funding allocations to developing countries" (Mace 2005: 246).

3.4.8 Reporting on adaptation

Although the issue of adaptation has been on the climate change agenda since the 1990s, few resources have thus far been generated. Adaptation includes changes in behaviour, infrastructure, policy, technologies and management. The National Adaptation Programmes of Action (NAPAs) are programmes to assist the 50 least developed countries to prepare an analysis of the impacts of climate change and how they can best adapt on a priority basis to the potential impacts. 30 NAPAs have already been received and many have been supported by the GEF.

Adaptation needs are different for different groups of DCs. The common vulnerable sectors for most of the developing countries are the agricultural and water sector. For coastal nations – the coastal infrastructure and communities are at stake. The National Communications and the NAPAs indicate the range of different challenges faced by the different countries within the developing world. They also give estimates of the possible costs of adaptation.

3.5 Human rights

In addition to the above principles, concepts and instruments, a key issue is the notion of human rights. One can argue that all humans should have equal entitlements to use the atmosphere and that humans have a right to a clean environment (Larmuseau et al 2007; Cook & Tauschinsky 2008). These could derive from the existing human rights declarations as well as the Rio Declaration (Principle 3 and Principle 5). This is particularly topical nowadays as the UN Human Rights Council has adopted a decision on 26 March 2008 that it:

Decides to request the Office of the United Nations High Commissioner for Human Rights, in consultation with and taking into account the views of States, other relevant international organizations and intergovernmental bodies including the Intergovernmental Panel on Climate Change and the secretariat of the United Nations Framework Convention on Climate Change, and other stakeholders, to conduct, within existing resources, a detailed analytical study on the relationship between climate change and human rights, to be submitted to the Council prior to its tenth session;

Encourages States to contribute to the study conducted by the Office of the High Commissioner;

Decides to consider the issue at its tenth session under agenda item 3, and thereafter to make available the study, together with a summary of the debate held during its tenth session, to the Conference of Parties to the United Nations Framework Convention on Climate Change for its consideration.

Thus, the discussion on the human rights to a healthy environment will be discussed in the coming years. Since the Maldives requested this decision, it will definitely also cover the adaptation side of the issue.

(http://www2.ohchr.org/english/bodies/hrcouncil/docs/7session/A-HRC-7-78.doc)

3.6 Legal actions in different parts of the world

In the meantime, there is considerable climate change litigation taking place in different parts of the world. Furthermore, a number of articles also explore the potential of taking action in courts. The following table sums up the court cases and their relevance for adaptation.

Table 0.1 Current environmental legal actions around the world

Subject	Type of action	Country	Description	Link to adaptation
Export credit	Freedom of information	Germany	Export credit agencies are not providing information about GHG emissions from their projects	No link
	Environment Impact Assessment	USA	Export credit agencies violate national laws	Links between emissions and impacts
Mine expansion	Breach of statutory duty; environment impact assessment	Australia	Action claiming that a minister did not have the power to prevent the assessment of GHGs from a project	Links between emissions and impacts
Corral reefs	Breach of statutory duty – environment impact assessments	Australia	Action claiming that the Government has failed to take into account the impacts on, i.a., corral reefs.	Links between emissions and impacts
Gas flaring	Violation of human rights and environmental obligations	Nigeria	Communities are suing the major oil companies for gas flaring resulting in increased local pollution and GHG emissions	Violation of human right to clean environment and of environmental obligations
Public information	Freedom of Information	Argentina	Citizens used Article 6 of the Convention and right to information to show that infrastructural protective measures for citizens was not undertaken	Link between freedom of information and adaptation
Power companies	Common law nuisance	USA	Some states and NGOs sued 5 major power companies for nuisance	Link between emissions and impacts
GHGs	CO_2 should be seen as pollutant; Pollution regulatory functions	USA	States have sued the EPA for failing to regulate CO_2 as a pollutant	Links between emissions and impacts
GHG emissions	Violation of human rights	USA	Inuit Community claims that the USA is violating their human rights before the Inter American Court of Human Rights.	Link between emissions and human right to clean environment
World Heritage sites	Enlisting as World Heritage in Danger under World Heritage Convention	Nepal, Peru, Belize, Canada, USA	Requesting UNESCO to grant status as World Heritage in Danger (Everest National Park; Belize - barrier reef; Peru - Huarascan National Park; Waterton-Glacier International Peace Park)	Link between emissions and impacts on heritage sights.

Source: updated and modified from Gupta 2007.

A number of options are still being considered in the literature as has been indicated throughout this paper and these may potentially mature into litigation in the future. These are presented in Table 3.2.

Table 0.2 Potential legal avenues discussed in the literature

Nature of action	Country	Description	Suggested by:
Request the ICJ for an advisory opinion	Small island States*	Request the ICJ to give an advisory opinion on whether the climate change negotiations are being conducted in good faith and protecting the most vulnerable countries	Gillespie 2004
Violation of UNCLOS	DCs/EU	Failure to ratify the Kyoto Protocol amounts to violation of UNCLOS	Burns 2004; Doelle 2004
Violation of no harm principle	SIDS	Tuvalu could sue the USA before the ICJ on grounds of the no harm principle	Jacobs 2005
Disclose emissions to SEC	USA	Companies should disclose emissions to SEC to limit liability	Hancock 2005

Gupta 2007

3.7 Research issues

This chapter shows that the restricted territorial sovereignty principle is established in law and there are two sides to this – a no-harm side and an ability-to-pay side. With respect to the no-harm side, there are "before harm" principles and "after harm" principles. Clearly the responsibility for after harm may be less where there have been many measures taken in the "before harm" phase and due diligence has been exercised. The ability-to-pay side has two components – a responsibility on developed countries to help others through technology transfer and capacity building and a reduced responsibility for developing countries to adopt modern standards and legislation.

Liability for acts forbidden by international law is clear; liability of acts not expressly forbidden by international law is less clear. What is or is not expressly forbidden is a question of interpretation. However, if harm ensues, some compensation has to be paid and this is captured in the new notion of allocation of loss. Much more research needs to be done on this issue.

In principle, states can be held responsible for wrongful acts if they were aware that these acts were or could be seen as wrongful from the moment of cognisance of such acts. Only court cases can actually test out what may happen here; but research can also play a crucial role.

In principle, those affected may be able to sue in the domestic courts of other countries where the domestic laws of these countries allow them to do so. Provision has been made in the SADC Protocol of 2000 to allow SADC citizens to sue in each others countries. Research into this area may also be fruitful.

Operators can be held responsible for their harm. There is already a series of legislation available in Maritime and Fresh Water Law that allows for this, and there is no reason to suppose that this may not be the case in the future.

Finally, the relationship between climate change and human rights needs to be studied and developed further.

These raise a number of research questions for the future.

- How do the principles in the Climate Change Convention determine how resources to fund adaptation measures should be raised?
- What is the nature of the link between climate change and human rights?
- What is the nature of the vulnerability of different countries and should they be classified in different groups for the purpose of assessing who should most likely receive financial assistance?
- How can access to national courts further develop the notion of liability to climate change and compensation for adaptation measures?
- Can states be held liable for harm caused elsewhere if they act in accordance with an international treaty?
- How do the principles in the Climate Change Convention determine which sort of adaptation measures in which sort of developing countries should be financed?
- What are the different kinds of measures that can be adopted to promote adaptation and what legal instruments can be designed to promote such adaptation?
- What legal principles can be used to define the responsibilities per country in terms of generating resources for adaptation?
- How can one raise resources commensurate with those needed to deal with adaptation?
- What sort of policy priorities can be identified to help countries cope with uncertain impacts?
- How can the international legal regime develop further?

4. Adaptation at the EU and national level

4.1 Introduction

In the course of the 1960s, the debate on climate change was opened by questioning whether climate change was a problematic issue. Soon thereafter, scientists questioned whether climate change would have serious impacts on the living environment on a global scale, and what adaptive strategies could be developed to cope with the negative impacts of climate change (Schipper 2006: 82-92). Traditionally, scholars distinguish between, on the one hand, mitigation of the emission of greenhouse gasses and, on the other hand, adaptation to a changing climate, as possible reactions to these effects. This research focuses on the legal aspects of adaptation to climate change from international to local level, and this chapter focuses on supranational and national level issues taking into account the role of public and private participants or actors. The term 'adaptation' means taking actions to cope with the negative effects of a changing climate, reducing the risk and damage from current and future harmful impacts in a cost-effective way, or exploiting potential benefits (EC COM 2007b).

This chapter investigates the available literature on adaptation to a changing climate, more specifically the literature addressing the way in which legal institutions across Europe and the Netherlands are dealing with the challenge. Europe and the Netherlands are discussed together because they share the same legal system. The focus is primarily one of administrative or public law. Private-law issues and combined public/private-law issues are also addressed, since adaptation to a changing climate does not only hold tasks for public participants (governments), but also for private actors (citizens and businesses). The administrative-law discipline addresses the ways and merits of regulation by government on the one hand, and the legal position of citizens in relation to the government, explicitly the legal protection of citizens against acts of the government, on the other. Traditionally, much attention has been paid to the instrumental legal aspects, especially in the field of environmental law (i.e. which instruments could be used by governments, and to what extent are these instruments effective?). Hence, the effectiveness of the instruments available to the government and the legal protection of citizens against governmental acts, hold a central position within the administrative-law discipline.

This chapter consists of two parts. The first part presents an overview of the relevant legal questions and issues, playing a role in the literature addressing adaptation to climate change. The second part raises relevant administrative law questions and issues, needing further academic attention in the near future. In the first part, we generally draw attention to the discussion on adaptation and the legal aspects thereof in the literature (2). Thereafter, we pay attention to the different (administrative and social) levels on which certain competences to take decisions on concrete actions can be found (3). Thirdly, the preceding findings are discussed within the light of specific policy fields of the EU and the Netherlands (4). Also the international relations between EU Member States and non-Member States (i.e. developing countries and developed countries outside the EU) deserve attention (5). Subsequently, the distinct research questions that have been addressed in the available literature are listed (6), followed by the creation of an analytical framework in favour of the most important legal questions deserving further attention in the future (7). Finally, conclusions are drawn and recommendations for future legal research on adaptation to climate change are listed (8).

In relation to the selection of literature, we make the following remark. Unlike other disciplines, within the legal discipline no standards or rankings of available literature (for instance the ISI categories) exist. Therefore, such a categorisation on quality is not to be found in the literature list. The selection of literature is based on our own judgment, based on the themes and research subjects that have – in our opinion – rightfully been addressed in the legal research on adaptation to climate change through time. The available international, European and national legal journals have been investigated for the presence of publications on adaptation to climate change. We have also searched the library and the internet for relevant books and publications. On the basis of references in footnotes and other references we more closely searched for relevant literature. Of course, this research could be of value to determine the future research agenda, at least in so far as this research has led to concrete ideas on further research. On certain themes and subjects, gaps in knowledge seemed to exist. We tried to create possibilities to fill these gaps by identifying recommendations for future research.

4.2 General remarks on adaptation and law

History

Adaptation to climate change has not been a much-discussed topic until recent years, neither in literature, nor in practice (Kane and Yohe 2000: 1-4; Smith, Klein and Huq 2003). The main focus was on the reduction of the emission of greenhouse gasses, the so-called mitigation activities. However, during the last decade, attention to adaptation to climate change has increased explosively. This explosive increase of attention has three main reasons. First, the awareness came into existence that the climate is already changing in an irreversible way, and that in addition to or instead of the reduction of anthropogenic influence to the climate (mitigation), there is a specific need to adapt to a changed or changing climate (adaptation by way of reducing vulnerability). The second reason is found in changes and developments in the discussion on the role of adaptation as an alternative to mitigation (Schipper 2006: 83-84; Adger et al. 2005: 75-76). The third reason is that although during the early days of the climate change negotiations, there was awareness of the need to focus on both mitigation and adaptation, a legal strategy to focus more on mitigation as a global challenge and on adaptation as a local challenge implied that there was less political and research focus in this area. While this was partly to avoid liability issues, it was also based on the argument that if we focus more on mitigation, there will be less need for adaptation.

The origin of the concept of adaptation can be traced back to the late 1960s and early 1970s (the Club of Rome[8]). During the following decennia, the concept of adaptation underwent an impressive development, and was, *inter alia,* adopted in the United Nations Framework Convention on Climate Change (UNFCCC) (Schipper 2006: 82-92). As stated above, attention to adaptation to climate change in literature remained modest. Nowadays, within the so called realist view, adaptation to climate change is not considered to be an alternative to mitigation of the emission of greenhouse gasses anymore, but is regarded as an inevitable reaction to climate change in addition to mitigation (Kane and Yohe 2000: 75-102). Taking adaptation measures in combination with mitigation measures could have a strong complementary and synergetic outcome. So, the emphasis in the climate debate shifted from the general question 'mitigation or adaptation?' to much more concrete questions (how, by whom, and to what extent?) (Klein 2007: 582-583). The cost-effectiveness of reactions to climate change appears to be of high importance in answering such questions (Mitigation and Adaptation Strategies for Global Change 2007, nr. 5; Parry et al. 2007).

Legal aspects in European and national literature

At first sight, there is relatively little legal literature on adaptation to climate change (Verschuuren 2007; Ramnewash-Oemrawsingh and De Kramer 2006; Teesing 2007: 79-89). In addition to a lot of natural science papers, most publications on adaptation are from the socio-economic perspective. In these publications, *inter alia,* systems have been created for 'measuring' vulnerability to climate change, and the results of these measurements have been linked to concrete adaptation strategies (Kelly and Adger 2000: 325-352). Furthermore, systems have been developed for analysing certain justice issues and equity issues within the international community, mainly relating to the responsibilities of developed countries in (financially) aiding developing countries in mitigating and adapting to climate change. There is a general search for a fair division of responsibilities (Van Rijswick 2008) in relation to climate change and the (disadvantageous) effects of it (Keessen and Van Rijswick 2008).

However, the adaptation discussion does have a number of serious legal aspects. In fact even the socio-economic discussion seems mainly to lean on important (general) legal principles, such as justice (Thomas and Rwyman 2005; Paavola and Adger 2002), equity (Cazorla and Toman 2000), and sovereignty (Melkas 2002). This discussion mainly takes place in the framework of the UNFCCC and the Kyoto Protocol, and therefore has a strong international character.

The Dutch legal system, especially the Dutch system of administrative law, mainly contains instrumental provisions. Especially in comparison to the international and the European legal system, this is remarkable. General and fundamental legal principles, such as the 'no-harm principle' (international law) and the precautionary principle (European law), have found their way into supra-national law much more than into national law (Van Rijswick 2008). A first question is - to what extent

[8] Also see www.clubofrome.org.

this is desirable? Another question is: whether this is disadvantageous, and if so, whether the disadvantages could be minimised by specific regulations. In short, the desirability of the extension of the normative force of legislation is at question.

In direct connection to the questions above, it is questionable what the desirable level of supervision of the state is over its own acts. In classical constitutional theories, this supervisory function is primarily a judicial task. In the absence of a clear substantive legal provision, this judicial supervision contains only a marginal review.[9] This calls for a more transparent (and a more fundamental) legal provision, as well as a call for consolidation of the system of judicial supervision. At least in relation to the Dutch legal system, this leads to the question - to what extent is the judge in charge of the supervision over legislation. Until now, the relationship between the judicial and the legislative authority has not only been expressed by the Dutch constitutional prohibition of constitutional review of formal laws[10], but also by the traditionally reticent attitude of the Dutch judge in testing legislation more in general. An increase of substantive normative rules in legislation, especially when shaped as fundamental principles, could remarkably alter this relationship. Of course, this judicial supervision would not only call on governments to fulfil their tasks, but also have impacts on those governments that over-react and thereby unjustifiably violate civil rights. An important question, to be answered by the supervising judge, should be - to what extent the uncertainty climate change creates, could justify the intervention of the government. Questions on the *quality* of governmental intervention cannot be answered by the judge, but should be directed to and answered by the people's representatives (and its advisory bodies).

European policy on adaptation

The Green Paper on adaptation to climate change states that Europe (the EU) has to adapt to the expected impacts of climate change. Although, adaptation may be economically profitable in the long term, but there should be no sole reliance in the market and market forces, because of the uncertainty of climate impacts and the lack of financial resources. Cost-effective adaptation is therefore the most appropriate solution, according to the Green Paper (EC COM 2007b: 9). In addition to market forces, on the EU level climate strategies have been developed, as well as separate strategies for scarcity of water and drought (EC COM 2007c).

Climate change adaptation strategies

There are numerous reasons for the EU to develop European climate strategies of its own, for climate change influences current EU policy fields highly, especially the policy fields of agriculture, water, ecosystems and biodiversity, marine and fisheries, rural and regional developments, industries, transport, health, energy, common foreign safety policy, and immigration. Furthermore, climate change affects the internal European market, because there are many effects on economic sectors that have been integrated at the EU level. The effects of climate change do not take into account any administrative borders, and neither does water. Hence, in relation to water, adaptation is to be undertaken within the context of the river basin approach of the Water Framework Directive (Directive 2000/60/EC) to establish a coherent system of cross-border cooperation. Within an EU policy framework, specific adaptation measures in different policy sectors could be adjusted to each other, and knowledge and experiences could be exchanged. Within the framework of external relations, the EU wishes to play an important leading role, not only in the field of mitigation, but also in the field of adaptation. Finally, the EU foresees a major risk for vulnerable areas, not only within, but also outside the EU. On the basis of an EU policy framework, the EU expects that compensation by the EU (or the Member States) for sustained damage could be restricted, and (local) agitation leading to a growing migration from vulnerable areas to the EU could be prevented (EC COM 2007b).

The EU climate strategies do not contain any hard measures or concrete proposals for new legislation. The most important assumptions are regional measures and multi-level governance, with an important role for regional and local governments. The main aim is the integration of adaptation within the entire EU policy field. For the realisation of these aims, spatial planning is an important instrument to make countries and regions climate-proof. Consequently, there is a proposal to amend the Strategic Environmental Impact Assessment Directive (EIA-Directive) to ensure that in future

[9] This means that the judge may only consider whether the government could *reasonably* have taken a decision, or whether it could reasonably have acted in the way it did.

[10] Article 120 of the Dutch Constitution states that no judge will judge the constitutionality of laws and treaties.

climate change aspects are taken into account in assessing the spatial plans and projects and will be an integral part of the strategic environmental effects assessment. Furthermore, the proposal to consistently apply the 'the user pays' principle to the distribution of scarce water is especially relevant. Application of this principle in addition to the role of economic incentives to promote the sustainable use of water is primarily based on the Water Framework Directive. The distribution of scarce water is being worked out in greater detail in the Water Scarcity and Drought Strategy of the European Commission. Within the strategy on adaptation to climate change, furthermore, a role is given to adaptation (measures) in the specific EU financial programmes. Special attention is to be given to the position of the European society; the private sector and the public sector, for all these sectors have to be involved in developing concrete adaptation strategies. For this purpose, the establishment of a European Advisory Group for Adaptation to Climate Change has been considered.

Adaptation policy in the Netherlands

The Netherlands set up the National Adaptation Strategy (NAS) and the National Programme on Adaptation in relation to Spatial Planning and Climate (*Programma Adaptatie Ruimte en Klimaat ARK*; National Adaptation Strategy).[11] In the National Adaptation Strategy the central government, the Provincial Discussion Body (*Interprovinciaal Overleg -IPO*), the Association of Dutch Municipalities (*Vereniging van Nederlandse Gemeenten VNG*) and the Union of Water Boards (*Unie van Waterschappen*)[12] jointly determine the common assumptions for the policy process that has to make clear what measures the Netherlands have to take to cope with effects of climate change in an effective way. The leading principle in the National Adaptation Strategy is risk management/control. One should re-design spatial distribution, in the sense of creating safe areas, taking protective measures for population concentrations, guaranteeing the adequate functioning of main ports and infrastructure under extreme conditions, and guaranteeing adequate and quick rendering of assistance and aid in case of emergencies (MNP 2007: 6). Understandably, attention in the Netherlands is mainly focused on taking infrastructural measures to provide for sustainable coastal protection and a robust river system. Flooding has to be prevented at any cost. Furthermore, policy addresses the realisation and maintenance of a high water quality, with attention to drinking water supplies and recreational facilities. It also addresses a robust Ecological Main Structure to minimise the vulnerability of nature to climate change.

Research by the Dutch Environment and Nature Planning Agency indicates that national climate policy is in line with the EU climate strategy, although some differences do occur. Both policy visions emphasise regional, area focused measures and multi-level governance. In the Netherlands more attention is paid to the role of the spatial planning and to public safety and water nuisance. In the EU Green Paper little attention is devoted to the (possible) effects of drought in northern European countries, while in the Netherlands salification occurs as a consequence of droughts and water scarcity. On the other hand, the Netherlands in their national strategies merely pay attention to health issues, and state that the possibilities of cross-border cooperation based on the Water Framework Directive and the Flooding Directive are sufficient. The EU climate strategy rather benefits than hinders the Netherlands. However, the Netherlands accentuate that there is no need, nor any wish for new legislation (VROM 2007)[13], for most of the proposed measures (in the EU climate adaptation strategy and in the proposed policy on water scarcity and drought) have already been implemented in the national policy and legislation (Keessen and Van Rijswick 2008).

[11] *Maak ruimte voor klimaat. Nationale adaptatiestrategie – de interbestuurlijke notitie*. Joint report from VROM, V&W, LNV, EZ, IPO, VNG and Unie van Waterschappen.
[12] Respectively the Interprovincial Consultations, the Association of Netherlands Municipalities, and the Union of Water Control Authorities.
[13] Letter of the Minister van VROM, *Reactie op het Groenboek EG*, IZ/2007124616 van 19 december 2007 and Kamerstukken II, 2007-2008, 22112, nr. 567.

4.3 Relevant levels and cooperation (multi-level governance)

Levels and actors

Actual adaptation to climate change ranges from passivity on the one hand, to proactive and reactive action on the other at the international level (Hey and Van Rijswick 2007), but also the national, regional, local, and individual levels. Passivity on a higher level implies delegation of adaptation responsibilities (and also adaptation competences) to lower levels. Besides, proactive and/or reactive action on a higher level influences the discretion of *inter alia* choosing concrete adaptation measures on lower levels (Paavola and Adger 2002). On the different levels mentioned above, numerous actors play a role (McEvoy, Lonsdale and Matczak 2008). First of all, these include the governments and public bodies on the local through to the European level and sometimes international agencies too can play an active role in adaptation to climate change. Also on the societal level different actors can be distinguished, such as societal groups, companies, or even individuals (Gupta 2007: 131-137). To what extent these actors can make decisions on taking specific adaptation measures differs per actor and per level, as does the possible (societal) impact of these decisions (Adger et al. 2005: 79-80). Illustratively, under high pressure of flooding risk a (head of a) family decides to move away from an area to a more safe, higher located area. This adaptation measure may have a great impact on the family as such, but merely influences society. This influence increases when a vast number of families (a societal group) under the same pressure make the same decision. The decision of a public body, again under the same pressure, to build or strengthen dikes, or to facilitate or enforce removal on a large scale, likely has even greater societal impact.

Successful adaptation measures

It is hard to predict beforehand and in general which adaptation measures should be taken on which level for the adaptation as such to be called *successful*. Adaptation consists of three goals – to decrease the vulnerability of societal systems to climate change; to alter the exposure of the system to climate change and to increase the resilience of the system to cope with climate change. The success of adaptation measures can be measured on the basis of certain criteria. Adaptation measures, *inter alia,* have to be effective, efficient, equitable en legitimate to be successful. Besides that, although a concrete adaptation measure could be successful in the short term, it may be unsuccessful in the longer term. Finally, a concrete adaptation measure may be locally or personally beneficial whilst increasing vulnerability in other areas or to other individuals or groups (Adger et al. 2005: 80-83).

This implies that adaptation measures have to be evaluated on a case by case basis. Measures should therefore be taken at the most appropriate level, and should be complementary, based on joint partnerships. Furthermore, there is need for close coordination (horizontally and vertically) between and involvement of national, regional and local authorities (EC COM 2007b: 11-12).

Coordination and (intergovernmental) cooperation

The Green Paper states that physical, biological and man-made systems in Europe are very diverse, and that climate change will accentuate this diversity. A uniform European standard approach on adaptation to climate change therefore seems inappropriate, or even impossible. Nevertheless, disadvantageous effects of climate change do not take into account administrative borders, which calls for cross-border cooperation between all actors on all levels. Actual measures should be taken at the most appropriate level. The operational capacity at a specific level should be a decisive factor by the indication of the most appropriate level. Moreover, all measures (to be) taken should cost-effectively be coordinated. This coordination preferably takes place at the EU level.

Cross-border cooperation could (and should) be given form by using a differing range of instruments. International cooperation (by central governments) should take place by signing treaties. If necessary, also the European Community could be a party to these treaties. Also the Treaty of Madrid should be mentioned, as well as the bilateral or trilateral treaties based on this treaty (for instance the Benelux Treaty and the Anholt Treaty). These treaties create possibilities for decentralised governments or public bodies to cooperate across borders. Finally, the European regulation on European Groups for Territorial Cooperation creates a possibility for cross-border cooperation between (decentralised) governments (Gilissen 2008).

Financing adaptation measures
There are several European financing programmes that possibly can be used to finance adaptation measures. Integration of adaptation strategies within current Community financing programmes is an important point of attention, requiring action in the EU at an early stage. The Green Paper gives a good opportunity to investigate to what extent there is room for adaptation measures to climate change in current financing programmes (EC COM(2007) 354, SEC(2007) 849: 14 and 19). The EU and/or any separate Member States may profit from other (international) financing sources.

4.4 Adaptation measures within policy sectors of the EU and the Netherlands

Policy sectors
On a global scale, the effects of climate change may be felt within nine policy sectors based on the current literature on adaptation to climate change, and on experiences from recent assessments, such as the 'U.S. national climate change impact assessment' and the third and fourth Assessment Report of the IPPC Working Group II. These nine sectors are: water (management), forestry, biodiversity, coastal areas, food supplies, health, cities and communities, energy and industries, and recreation (Wilbanks et al. 2007: 715-721).

The Green Paper also distinguishes policy sectors in which the effects of climate change will occur or already have occurred. The policy sectors distinguished in the Green Paper are:

- water (EC COM 2000) 477; EC COM 2007c; Heiden, Erb & Sieker 2001; Van Rijswick et al. 2008; Solf 2006),
- ecosystems and biodiversity (Bastmeijer and Verschuuren 2007; Frisch, Vagg and Hepworth 2006; Hannah et al. 2002; Hannah et al. 2002b),
- food supplies,
- marine areas,
- agriculture,
- forestry (Sedjo 2006; GoNZ 2001; IPCC 2000),
- fisheries,
- tourism (beach and ski),
- health, and
- energy and industries.

According to the Green Paper, climate change will heavily affect Europe's natural environment and nearly all sections of the society and the economy. Within Europe, some areas are considered to be especially vulnerable. These areas are Southern Europe and the Mediterranean Basin, mountain areas (in particular the Alps), all coastal zones, densely populated floodplains, Scandinavia, and the Arctic region (EC COM 2007b: 4-6). Within the different policy field of these areas, the most appropriate adaptation measures should be taken at the most appropriate level by the authorised body.

Opportunities
Climate change may have negative impacts, but it may also bring new economic opportunities including new jobs and markets for innovative products and services. For instance, areas formerly unfit for agricultural activities can prove very fertile under changed climatic conditions, such as a higher temperature or more rainfall. The Green Paper sums up four examples of opportunities that climate change will probably bring. These opportunities are: new markets for climate-proof building techniques, materials and products; changes in and extension of high seasons of beach tourism in Mediterranean countries and in the Atlantic and North Sea region; longer growing seasons profiting agriculture in Scandinavia; new opportunities for the insurance sector to develop insurance products for reducing risk and vulnerability (EC COM 2007b: 10-11). The question remains - who should profit from these opportunities. Should all profits be distributed equally, or should they be distributed among certain groups of society?

Concrete adaptation measures
A distinction can be made between 'soft', relatively cheap, and 'hard', more costly adaptation measures. First measures are, for instance, water conservation, changes in crop rotations and sowing dates, the use of drought-tolerant crops, public planning and awareness raising. Examples of hard measures are increasing the height of dykes, relocating ports and industrial areas, relocating entire

cities and villages from coastal areas and floodplains to higher ground, and taking measures against failing hydropower stations. It is clear that most of the soft measures reasonably and equitably can and should be taken on a low societal level (i.e. the individual, the farmer, the entrepreneur). On a higher (administrative) level, clear adaptation policy should be developed, as well as concrete adaptation strategies and programmes raising awareness on lower levels. Furthermore, coordination of concrete measures should take place on these higher levels, and important decisions (e.g. on rural and spatial developments or relocations) should be taken there (EC COM 2007b: 10). Again, as climate change is of concern to everyone, everyone (on an individual scale to a societal or administrative scale) should bear the specific responsibilities that reasonably have been allocated to the different levels.

The Green Paper describes the effects of climate change within the concrete policy fields, which already have occurred, will occur or are expected to occur. Furthermore, in general, a description is given of the possible adaptation strategies and the concrete adaptation measures per level, as well as the frameworks within which these measures could be taken (EC COM 2007b: 14-19).

Legal liability and responsibility?

Above, it is stated that everyone has some kind of responsibility in taking adaptation measures to decrease the disadvantageous effects of climate change. An important and interesting question that arises is whether and to what extent a bearer of responsibilities (e.g. an individual, a company, a decentralised government or a state) could be sued at law to take these responsibilities into account. As long as there are no legal provisions clearly and unequivocally expressing these responsibilities, such a possibility does not seem to exist. Insofar as these provisions do exist, the possibility of litigation must not be excluded (Gupta 2007b; Faure and Nollkaemper 2007; Spier 2007). It has yet to be investigated if concrete legal provisions expressing and directing responsibilities to take adaptation measures exist. Further, it should be investigated whether there is a need for, other, more precise or extended legal provisions. For this purpose, the concrete responsibilities on the distinguished (societal and administrative) levels within the distinguished policy sectors should be charted, as well as the corresponding adaptation strategies.

How these adaptation strategies per level and per policy sector should be elaborated in concrete policy and legal provisions is hard to say at this moment. At first, it is of importance to clearly locate these responsibilities, before anything can be stated about how these could and should be converted into actual policy or rules.

In order to reduce civil uncertainty, liability law at least puts an obligation on the government to actively disclose information about the possible consequences of climate change.[14] The more certain activities are brought under governmental responsibility, the bigger the governmental liability risk will be. This could undesirably lead to a government keeping its hands off, trying to avoid liability risks. This, once again, brings up the question how liability risks should be divided between civil society and the government. That question can not only be answered in terms of public law. Where private and public law come together, another question comes up, namely, the question to what extent other arrangements (between civilians or between civilians and the government), regarding reaching agreements on the division of risks and liability, could be imaginable and useful.

The use of financial instruments

Within the EU policy on adaptation to climate change, financial instruments are claimed to play an important role. As stated above, the Green Paper on adaptation to climate change notes that Europe (the EU) has to adapt to climate change. Economically, adaptation could be profitable on the long term, but there should be no sole confidence in the market and market forces, because of a certain degree of uncertainty in the climate projections and a lack of financial resources. Cost-effective adaptation is therefore the most appropriate solution, according to the Green Paper. In addition to market forces, on the EU level climate strategies have been developed, as well as separate strategies for scarcity of water and drought.

It has also been stated above that there are numerous reasons for the EU to develop European climate strategies of its own, for climate change has impacts on current EU policy fields, especially the policy fields agriculture, water, ecosystems and biodiversity, marine and fisheries, rural and regional

[14] The Treaty of Aarhus should also be taken into account.

developments, industries, transport, health, energy, common foreign safety policy, and immigration. Furthermore, climate change affects the internal European market, because there are many effects on economic sectors that have been integrated at the EU level. The proposition to systematically apply 'the user pays' principle to the distribution of scarce water, is especially relevant. Application of the principle 'the user pays' in addition to the role of economic incentives to promote the sustainable use of water, is primarily based on the Water Framework Directive. The distribution of scarce water is being worked out in greater detail in the Water Scarcity and Drought Strategy of the European Commission. Within the strategy on adaptation to climate change, furthermore, a role is given to adaptation (measures) in the specific EU financial programmes. Special attention is to be given to the position of the European society; the private sector and the public sector, for all these sectors have to be involved in developing concrete adaptation strategies. To this purpose, the establishment of a European Advisory Group for Adaptation to Climate Change has been considered.

At the national (legal) level (and eventually on the scale of concrete projects and plans) the recently integrally revised and amended Spatial Planning Act creates new possibilities to recover the costs of government-funded infrastructural works or other works, from the ones profiting from the building of that work. Especially the new legal provisions concerning 'estimation of land development' ('*grondexploitatie*'; chapter 6.4 Spatial Planning Act) have considerably extended these possibilities of recovering costs by means of private law (legal agreement) or by means of public law ('*grondexploitatieplan*'). Conceivably, within the sphere of new spatial projects or plans, the building-costs of facilities or provisions for adaptation to climate change (e.g. the building of extra water-resistant facilities in case of residential building outside the area protected by dykes) will be recovered from the building contractor/developer. Especially where costs are recovered by means of private law, the possibilities of recovering costs are wide-ranged. These possibilities even tend to equalise the costs of unprofitable zones or functions with the earnings of the profitable ones. Of course, agreement from the contract partner is required, but when this agreement is reached the recovery of costs for developments outside of the planning area could also be included in the agreement. As to cost recovery by means of public law, the possibilities are more limited. Although these possibilities do include cost recovery of (nature) compensation (Van Buuren et al. 2008; Driessen 2008). In case of cost recovery by means of public law, the relation between the public work and the recovery of costs should be considerably more direct, than by the recovery of costs by means of private law.

4.5 International relations between the EU (or EU Member States) and non-Member States

Financing obligations toward developing countries

Globally and historically, the EU and its Member States have a remarkable share in the emission of greenhouse gasses and are therefore (co)responsible for climate change. Developing countries have a much smaller share in the emission of greenhouse gasses, while the effects of climate change in these countries are more often threatening. These effects can be even more striking because most of these countries depend vastly on the exploitation of locally available natural resources. Therefore, it is reasonable that (rich, western) developed countries bear some responsibilities toward these developing countries. The EU considers it as an (moral) obligation to undertake action in order to stimulate adaptation to climate change in developing countries.

On a global scale, already several funds and/or financial obligations exist in order to aid developing countries in taking adaptation measures (see also Chapter 2). Article 4 section 3 UNFCCC imposes a general financing obligation on developed countries toward developing countries (Annex II). Article 4 section 4 UNFCCC explicitly holds an obligation for developed countries (namely the EU and most of its Member States) to bear part of the costs of adaptation to the adverse effects of climate change by developing countries (Verheyen 2002: 134-142). Article 21 section 3 UNFCCC indicates the *Global Environmental Facility* (GEF) as a financial interim-mechanism for financing projects, addressing *inter alia* climate change as a main point of attention (Mace 2005: 227). At the moment, there are four GEF-funds: the *GEF Trust Fund*, the *Special Climate Change Fund*, the *Least Developed Countries Fund*, and the *Adaptation Fund*. Based on these four funds, adaptation measures are eligible for financing, may it be on different grounds and under different conditions (Mace 2005: 225-246). Furthermore, the EU adopted the EU action plan concerning climate change and climate development in 2004. This plan, *inter alia,* consists of strategies for adaptation measures in developing countries. The European Commission also examines how to promote an enhanced dialogue and cooperation between the EU and developing countries on climate change, through the building of a Global Climate Change Alliance (EC COM 2007b: 22-23).

Cooperation with neighbouring countries and other industrialised countries

The EU should also involve neighbouring countries and regions into adaptation efforts. The most important countries/regions to be involved are Russia, Europe's far North, Greenland, the Black Sea, the Mediterranean Basin, the Artic region, and the Alpine region. This should lead to the encouragement and support of these neighbouring countries and regions to analyse impacts, risks, vulnerabilities and suitable responses (adaptation strategies), and to adopt these into their development plans on adaptation to climate change. Especially cross-border issues, such as adaptation strategies in relation to regional seas, river basin management, ecosystem functioning, climate research, nature and biodiversity, disaster and risk management, human health, economic transition, trade, and energy supplies have to be taken into account (EC COM 2007b: 23).

At this moment, cooperation takes place within the framework of the *European Neighbourhood Policy* (ENP), which frequently and structurally addresses the problems of climate change. It is important to maintain, and if necessary intensify this cooperation structure. Based on the *European Neighbourhood and Partnership Instrument* (ENPI), the EU is able to support adaptation projects for the NPI countries and Russia. In other countries (especially in candidate and potential candidate countries), the so-called *Instrument for Pre-Accession Assistance* could be used. Preferably, an exchange of impact analysis and adaptation practices should take place between other industrialised countries in which more or less the same problems concerning climate change occur (for instance (certain regions in) Japan, Australia and the United States) (EC COM 2007b: 23). This demands a further elaboration of cooperation strategies and cooperation frameworks.

4.6 Mainstreaming adaptation in Europe's international aid policy [15]

The 1992 Treaty of the European Union made development cooperation a part of EU responsibility. Since the 1980's there has been growing pressure within the European Union to integrate environmental concerns into development cooperation policy in the EU. By the end of the 1990s, heads of state commented on the need for climate change considerations to influence other policy areas. As part of this ongoing process, in 2004, the EU adopted a strategy and action plan for 2004-2008 to integrate climate change into development aid planning (COM (2003) 85 final). This strategy was to be reported on biannually and reviewed thereafter.

This strategy aims to assist EU partner countries in dealing with climate change and implementing the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Commission sees this as mainstreaming climate change concerns in EU development cooperation while focusing on poverty alleviation. The strategy prioritises raising the profile of climate change, support for adaptation and mitigation and capacity building. While seeing these as distinct strategic areas, the Communication clearly states there may be synergies in practice.

Adaptation is the second strategic priority and is defined to include responses that may be used to reduce vulnerability to climate change. The EU promotes the mainstreaming of adaptation concerns and national action plans for climate change reported in national communications or national adaptation programmes of action (NAPAs), where they exist, into strategic frameworks such as national strategies for sustainable development. It aims to support the development of tools and capacities for the integration of adaptation concerns into national and sectoral planning and wide stakeholder involvement.

The Commission emphasises no-regrets measures and focuses on (a) Research on impacts, vulnerability and adaptation; (b) Integration of adaptation concerns into strategic frameworks and national and sectoral planning; (c) Improvement of relevant current policies and measures for adaptation; and (d) Continued support for relevant current projects in the field of conservation and sustainable management of ecosystems.

In general terms, researchers claim that integrating environmental policy requirements into development cooperation is proceeding with difficulty because of continuing shifts in priorities, poor cooperation between organisations, and lack of judicial consideration or definition (see e.g.: Williams 2007). The European Court of Auditors (2006) found that mainstreaming environmental issues in development cooperation was very limited especially in the work undertaken in the Country Strategy Papers (CSPs). Reflecting about this lack of performance, the European Commission (OJ C235/36: para 69) pointed out that "the environment is a particularly challenging area of development cooperation and partner countries often have higher political priorities." It underlined that the effective mainstreaming of the environment into development assistance depends not only on the Commission,

[15] Based on detailed research done by Nicolien van der Grijp and checked by her.

but also on the acceptance of environmental protection as a priority by the governments of the beneficiary countries and that this is not always the case.

Global Climate Change Alliance (GCCA)

In 2007, the European Commission proposed to build an alliance on climate change between the EU and the poor developing countries that are most affected and that have the least capacity to deal with climate change, especially the Least Developed Countries (LDCs) and the Small Island Developing States (SIDS).[16] This GCCA inter alia aims at renewing the commitment of the EU Action Plan on Climate Change and Development to systematically integrate climate change into development cooperation. The Commission has earmarked an additional budget of 50 billion Euros to the GCCA over the period 2008-2010. According to the Council, the initiative should be seen in the broader context of policy coherence for development, which is aimed at enhancing synergies between development cooperation and other policies.[17]

The GCCA initiative is meant as strictly complementary to and supportive of the ongoing process within the UNFCCC and the Kyoto protocol. It aims to provide a forum for dialogue and exchange as well as a means for effective cooperation. The Communication distinguishes five areas for effective cooperation, including a) adaptation to climate change, b) reducing emissions from deforestation, c) enhancing participation in the Clean Development Mechanism, d) promoting disaster risk reduction, and e) integrating climate change into poverty reduction efforts.

4.7 Adaptation in Dutch aid policy

The Netherlands is one of the few countries that provides more than the 0.7% of gross national income as aid and is seen as frontrunner in aid supply (OECD 2006). Aid levels were at 0.8% of GNP in 2006 (HGIS 2006). The government aims at sustainable poverty reduction. The policy focuses on providing most aid to poverty reduction and human and social development, followed by peace and security, though some money is directed towards reducing environmental degradation. Since 1997, the Netherlands ODA, influenced by research (Burnside & Dollar 1997; World Bank 1998) that aid is effective when provided to countries with good governance, decided to reduce the number of partner countries (VROM 2005). However, this meant that those who needed help the most did not receive it (MFA 2007b).

0.1% of GNP is used to finance environmental activities or activities where environmental concerns are integrated into other activities (MFA, 2003; MFA, 2007a). Since poverty alleviation also calls for accounting for climate change (Koenders 2007 speech at COP Bali); and since aid should meet developing country needs as well as the Paris Declaration on Aid Effectiveness (OECD 2005) as reflected in the speech of Koenders at the budget discussion on 21 January 2008, and since integrating mitigation and adaptation is seen as important (MFA, 2007a: 77), the Dutch government has decided to focus more on supporting adaptation activities in developing countries.

4.8 Survey of legal research questions from relevant literature

In the first part of Chapter 4, attention is drawn to certain legally relevant aspects of adaptation to climate change. The discussion regarding the role of adaptation within the climate debate, though, is relatively young. That makes this the right time to start profound legal research into the legal aspects of adaptation to climate change, for at this moment it is premature (or even impossible) to extensively draw any conclusions. Although, it is possible to generally indicate to which aspects the main focus will be aimed. Below, the legal research questions arisen from the literature study are summed up.

Generally

- What is adaptation to climate change exactly taken to mean, and what historical development did this concept endure?
- How do adaptation (measures) and mitigation (measures) interrelate, and how could adaptation and mitigation have a complementary and synergetic effect?
- Which legal aspects are to be distinguished from the discussion regarding adaptation to climate change; to what extent and how could lawyers and the law contribute to this discussion?
- Which areas in Europe have been listed as vulnerable?

[16] Building a Global Climate Change Alliance between the European Union and poor developing countries most vulnerable to climate change, COM(2007) 540 final, 18.9.2007.

[17] Council Conclusions on a Global Climate Change Alliance, 2831st External Relations Council meeting, Brussels, 19-20 November 2007.

- Which concrete measures should be taken (on a local level) to cope with new climatic circumstances?
- Which chances could (the taking of measures to cope with) climate change bring?
- Within which (EU) policy fields, the effects of climate change would presumably occur?
- When has adaptation from an administrative-legal point of view been successful?

Authorities, regulations and levels of control

- Which authorities or entities are likely to be competent to take adaptation measures on distinctive administrative and societal levels?
- Taking into account the continuously changing risks and circumstances as a result of climate change, how should regulations be structured to effectively take adaptation measures through time?
- What is, appropriately, the best level to take (decisions concerning) concrete adaptation measures; how and by whom should these decisions and action preferably be taken?
- In case of horizontal administrative cooperation on a level or vertical administrative cooperation between levels within the EU is necessary, how and by whom should the coordination and regulation of this cooperation preferably take place; which legal instruments are available to that purpose?
- How could certain adaptation strategies per level and per policy field be converted into concrete policy and concrete regulations?

Financial aspects

- How could concrete adaptation measures be financed within the EU framework, and which legal limiting conditions have been attached to that?
- Which financial responsibilities and obligations do the EU and its Member States reasonably have toward developing countries, with regard to their aid in adaptation to climate change?
- Could and/or should those responsibilities be laid down in an act, or otherwise legally be made obligatory?
- Which possibilities do the Dutch national private and/or public law provide, to recover the costs for equalization and compensation of the building and construction of facilities for adaptation to climate change?

Policy fields (sectors)

- How could certain adaptation strategies per level and per policy field be converted into concrete policy and concrete regulations?

Actors and responsibilities in adaptation to climate change and ways of cooperation

- Which actors (public and private) play a role within the specific policy fields, and which of those should reasonably and equitably bear responsibility for adaptation to climate change on the specific level?
- How could the responsibility of the distinguished actors legally be regulated at its best?
- How could the public participation legally be regulated at its best?
- How and on which basis could cooperation between the EU and its Member States and neighbouring countries of the EU and other industrialised countries take place; to what extent does cooperation nowadays take place, and to what extent and on which points should this cooperation be intensified?

4.9 Gaps in knowledge: legal questions in relation to adaptation

Mainly, three concepts are discussed in literature on adaptation to climate change. These are: resistance, resilience and adaptability (see above; Adger 2005: 80-83). Furthermore, relevant aspects in this discussion are coping with ignorance, uncertainty and risk. With respect to the administrative-legal research, it is relevant to investigate whether these concepts also are of legal importance. Will European or national legislation stimulate or hinder (the taking of) adaptation measures? And how should concrete legislation be given form to cope with uncertainties and unknown risks at best? Which instruments and mechanisms are necessary, and how should competences and responsibilities be distributed between different actors? Which legal instruments are available to give form to

administrative competences, to (the execution of) cooperation mechanisms or to (the execution of) dispute settlement mechanisms?

A starting point and a central question that should be addressed in every administrative-legal research on adaptation issues, is to what extent the classical conception of regulation – based on the idea of the state under rule of law, the legal certainty, the protection of interests and (acquired) rights, and the democratic legitimacy – sustains the need for legal instruments and flexibility, which is necessary to adapt to changing circumstances. Especially and essentially, the friction between legal certainty and flexibility and between *government* and *governance* is of importance. This friction is especially of importance in relation to adaptation to climate change. Therefore, a solution for this friction is to be found.

Another central question that should be addressed within adaptation issues is whether the current proceduralisation in legislation and the development of multi-actor and/or multi-governance decision making are problematic, for they may create flexibility, but could be problematic to legal certainty, democratic legitimacy and legal enforcement by court decisions. Furthermore, it is relevant to investigate whether certain administrative governance concepts (that in itself could prove useful) could be brought in accordance with classical values of traditional regulation. In connection with that, the relatively recent fragmentation within the system of administrative law could be mentioned. In the meantime, as a reaction to this fragmentation, a more integral approach has been developed within this legal system (for instance the formation of the new Water Act, which *inter alia* aims to restructure the highly fragmented system of water law).

In a more legal-instrumental sense, the question is how can and should the – mainly administrative – legislator anticipate climate change and how should he or she react to the effects that have already occurred. Analogously, a relation could be drawn with the situation in the Netherlands of 1953 (actual flooding of certain coastal areas) and of 1995 (threatened flooding of the river area). The legislator reacted in both cases by issuing project-based legislation, characterized as emergency legislation. Especially in 1995, the existing administrative-law procedures hindered the urgent execution of the necessary reinforcement of dykes. A special law (*lex specialis*), the so-called *Deltawet grote rivieren* (Dgr), put aside these hindering procedural obligation, or even put aside the acts containing such obligations. The exclusive aim was the realisation of the required dyke reinforcements. The legislator himself regulated this extensively, specified in detail. Unsurprisingly, the execution of the Dgr has been a great success (Driessen and De Gier 1997). The execution of the (actual) *Deltawet*, primarily pursuing the extensive reinforcement of the coastal defence, was also a great success (Driessen, De Gier and Wiering 1999; Groothuijse 2007). Apparently, the government *is* able to actively and adequately react to urgent societal needs when there is a specific societal basis. The question is whether reaction (adaptation) to climate change is such an urgent societal need. In other words: to what extent could emergency legislation on climate change, perhaps addressing concrete projects, be an alternative to the common administrative-law instruments?

Pro-active regulation, pursued to withstand the adverse effects of climate change beforehand, counts as an alternative to project legislation as a *reaction* to an occurring or threatening situation. A main characteristic of administrative law is its procedural character, mainly ensuring the legitimacy of governmental action. But, to what extent does administrative law also *regulate* in a material sense? What do the few material regulations, such as 'the interest of the protection of the environment' (Environmental Management Act) and 'accurate spatial planning' (Spatial Planning Act) actually mean? To what extent does a possibility exist to introduce new material-legal regulations, based on the necessity of adaptation to climate change? A first condition should be that these regulations are more closely defined with respect to their content, than other general material-legal regulations. If not, they will share the fate of these general regulations, and they will only function as a 'coat stand' to (judicial) verification of administrative decisions.

To structure future administrative-legal climate research, we created the following framework. This analytical framework is based on a classification of legal questions, fitting and structuring the future legal research and creating the possibility to classify the multiplicity and diversity of these questions. Many (if not all) of the research questions occur on different levels simultaneously, especially on the international, the European, the national, the regional, and the local level. The classified research questions could be answered in general-theoretical terms, but could also be answered per policy field, where concrete adaptation measures are needed. These questions could also play a central role in more applied scientific legal research. The survey below shows a combination of research questions

that – occasionally – have been partly addressed in recent literature, and questions that have not yet explicitly been addressed. As to the latter questions, especially these deserve closer attention in future legal research.

I: Protection of interests, a justified distribution of these interests, and the forming thereof through rights, principles, objectives and regulations

When adapting to climate change several measures have to be developed, taking into account the significance of fundamental rights, principles and assumptions in relation to uncertainties concerning risks and chances of adaptation to climate change. Important principles regarding adaptation to climate change are the no-harm principle, the precautionary principle, the polluter pays principle but also the user pays principle. It is not yet clear if a stronger legal status of fundamental rights, principles and qualitatively formulated regulations lead to a higher level of legal certainty and/or flexibility. Adaptation to climate change also addresses distribution and equity issues: which interests have to be protected, and how will benefits and burdens be distributed between developing and developed countries, within Europe, within river basins, between policy fields or between the several stakeholders? Before specific measures can be taken – for example in the hot-spots in the Netherlands – objectives must be formulated in a clear and flexible way. To take the right adaptation measures regulation should be formulated with sufficient possibility to take into account uncertainties and unknown risks. In case of changing climatic circumstances, general objectives, such as 'the good condition of preservation', 'the good status of water', 'clean and enough drinking water', 'an accurate spatial planning', 'the interest of the protection of the environment', 'the sustainable use of resources', and 'good agricultural practices', should provide a flexible framework for verification. In some cases regulations will have to be strengthened (for example regarding safety) and in some policy fields adaptation to climate change ask for more flexible legislation and regulation (for example nature conservation). One could image that the precautionary principle should be developed in a way that it will create a higher level of flexibility than detailed regulations, but the conditions which have to be met to create a proper level of protection need further research.

II: Instruments

To take the right measures for adaptation to climate change legal instruments have to be sufficient. Some existing legal instruments will already be appropriate, but some existing instruments need to be changed and perhaps new instruments have to be developed. Instruments are necessary on several levels.

Good planning instruments are crucial for the final adaptation to climate change. This asks for further research into whether the existing planning instruments (spatial planning, environment, water, nature, traffic) should be changed in order to create enough flexibility. This leads to questions concerning the legal status of plans and to what extent these plans bear flexibility in addition to a conservatory effect (for example the possibility of function changes in land-use plans). Due to European obligations following from several environmental directives the legal status and significance of programmes of measures and plan terms, and the possibilities to offer to adapt to new points of view and other circumstances should be further examined.

Furthermore an important group of instruments are the assessment instruments, like investigation obligations of governments and private parties (e.g. environmental effects assessment, water assessment, and climate assessment). In adapting the hot-spots to climate change, interested parties have to be sure about who is obliged to investigate and what the role of the investigation (outcome) is in the final decision making. It is as yet unclear how integral a climate-related investigation obligation could and should be and where and how such an obligation should be laid down in legislation.

Due to the fact that adaptation measures may lead to a strengthening of norms it is necessary to research the possibilities to adjust and/or strengthen granted permissions or licenses, for example for the abstraction of fresh water, safety or the discharge of cooling water from, for example, bigger industrial installations.

At a more general level, an answer must be found to the question on which distribution instruments exist with regard to space (environment), public safety, pollution, nuisance, scarce resources, and how effective these instruments are? Before taking concrete action, governments should decide on the distribution question, for example because they do not want to be surprised by liabilities that had not been foreseen. What is the possible significance of liability law, for example in relation to claims on behalf of future generations, causation, standard of care, the precautionary principle, remedies, and procedural aspects?

There is a group of specific instruments that appears to be too conservative to be used in an adaptation strategy like the protection of areas (robust and of sufficient circumference) and the

protection of species. Development of urban areas, harbours, infrastructure have to take into account the restrictive impact of these instruments, because a lot of developments have to cope with strict requirements that cannot be dealt with due to changing natural circumstances like climate change.
A solution may be found in the use of economic instruments, such as, for example, water rights trading. In the same way Public-Private Partnership may under certain circumstances and within certain legal restrictions lead to successful arrangements.
At this moment there is not much experience as yet with insurances for damage caused by climate change, and also the possibilities of Compensation Funds can be explored to create shared responsibilities between government and private parties.
Integral assessments, adjustment and coordination may be necessary especially in the field of adaptation to climate change now the subject is not restricted to one policy area. It is however unclear to what extent several purposes can be served through the use of instruments from one policy field. Integration of adaptation measures in other policy fields (rule of speciality or rule of integrality) is widening the scope of the verification framework of statutory regulations needed, but within the Dutch legal system extensive interpretation of sectoral regulations may be the only solution. For example: does the concept of 'accurate spatial planning' contain the norm that climate change should be taken into account? The role of spatial planning is considered to be of high importance on the international and the European, as well as on the national level. However, it is not yet clear what exactly is the role of the spatial planning in the Netherlands and other EU Member States from a legal point of view. Neither is it clear how development-orientated the spatial planning is. To what extent is the Dutch concept of spatial planning as 'development control planning' ('*toelatingsplanologie*') useful in relation to the necessary adaptation to climate change? Adaptability and development-orientation (versus conservatory purposes and legal certainty) play an important role in spatial planning, energy, agriculture, infrastructure, water supply, protection against flooding, and water nuisance. To what extent should shifts occur in this system? It may be necessary to use more project-oriented legislation, such as the Dutch *Deltawet* (grote rivieren), as a useful alternative or addition to classical legislation with a pro-active regulation?
Finally the impacts of climate change will become more and more important in the execution and building of works, for instance urban developments, housing projects, construction of airports, construction of roads, industrial areas, improving energy-use, sustainable water-use, infrastructure, etc. Does this call for an amendment to the Building Decree ?

III: Levels of regulation, cooperation and conflict management
Adaptation to climate change calls for the most appropriate level of regulation (international, European, national, regional, local). The question is relevant for several topics such as cooperation. Research should be done into the forms of, actors in, and merits of cooperation; to what extent could public competences be the subject of cooperation or agreements? Which conflict settlement mechanisms could be thought of as useful? Which central mechanisms to come to decisions can be distinguished (such as instruction competences), and are these instruments effective? To what extent does coordination of decision making take place (for instance in the rule of integrality ex EC-law, European adaptation strategies, *Deltawet*, or project-orientated regulations)?
Climate change also requires adequate instruments in case of disasters and the question is whether the current competences are adequate?
Liability does have several functions, and can be a useful instrument in a climate change adaptation strategy. It can also lead to restricted action by governments simply because they fear liability. This leads to the question what is the role of liability in the climate change debate and to what extent may governments be held liable for damage when their measures or aid fail? In order to understand what the proper division of responsibilities between the government and private parties should be, there should be clarity about the extent to which the obligation exists to adequately inform about risks of climate change, so private parties can take their own protective measures.

IV: Public participation, legal protection and review
In environmental and climate law the role of public participation and access to justice is very important. This raises the following questions: to what extent do governments share knowledge, and to what extent should there be public participation; who has (a right of) access to a court; which interests will be protected (principle of relativity), and which interests can be brought before a court; how is the burden of proof divided; how do judges handle examinations of the facts and scientific data; what are the verification mechanisms or verification criteria to check the accuracy of decisions and measures, also in relation to uncertainties; should be dealt differently, with the protection of interests (inclusive acquired rights due to climate change (for example in relation to Article 1 First

Protocol ECHR); to what extent do legal protection and damage compensation create possibilities, in case wrongful adaptation measures have been taken?

5. Towards a research agenda

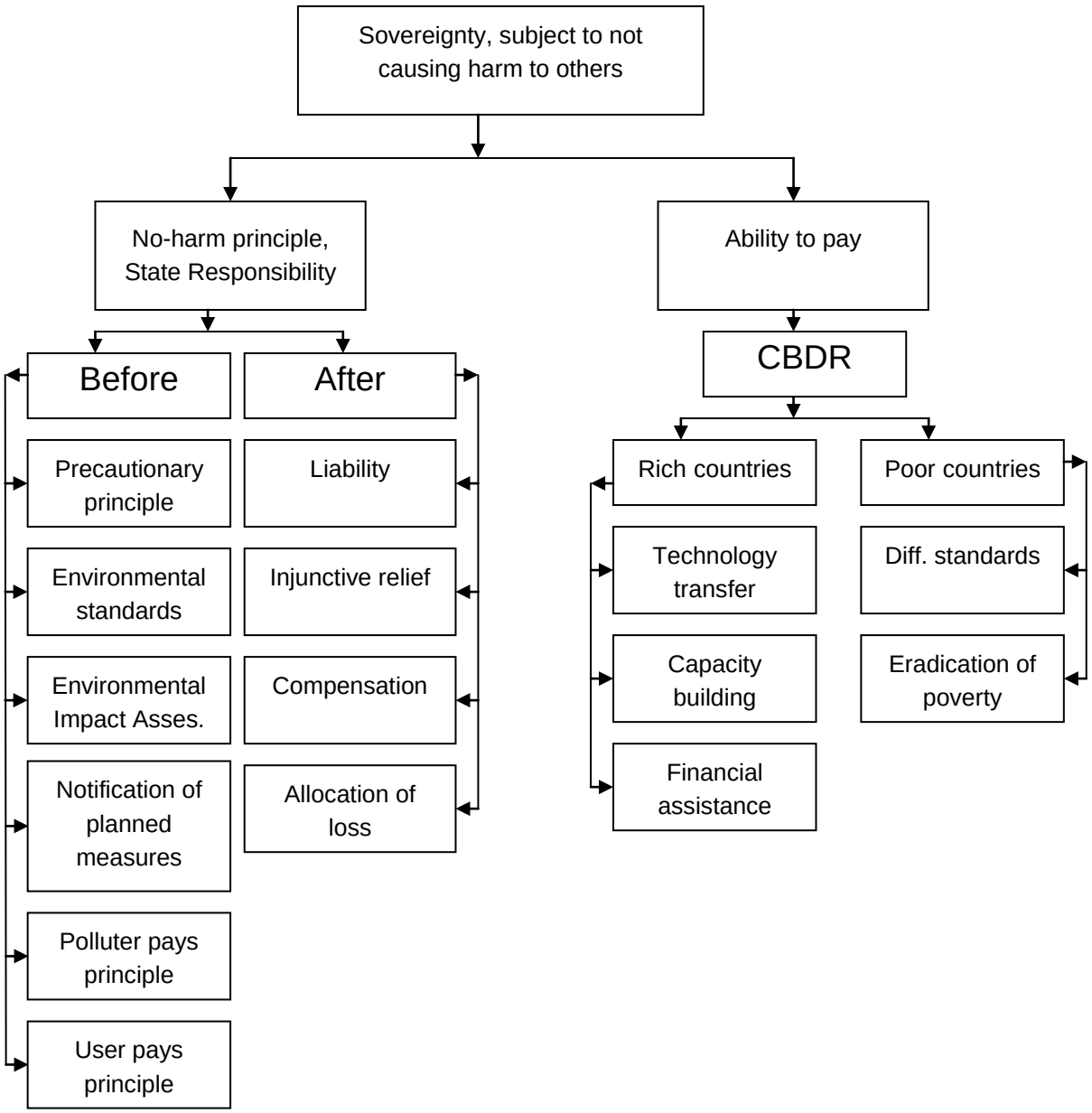
This document aimed to review the existing legal literature and literature relevant to making legal analysis in the area of adaptation to the problem of climate change with a view to identify research gaps and, hence, questions that need to be addressed in the near future.

Legal scholarship unlike other areas of scholarship focuses on both existing legislation, case law, legal literature, as well as relevant other literature that provides a basis for new legislation. It was difficult to identify with clarity areas that were purely 'law' and areas that were not 'law' and consequently we have attempted to make as comprehensive an overview as possible.

This document covers legal developments and legal literature from the global through supranational to the local levels. What is very clear is that pure law research in the area of climate change has been very much neglected in the national and international context and there are many areas in which research still needs to be done.

Following an assessment of legal issues arising with respect to adaptation in the climate change regime, this report looks at key legal issues that arise at a global level and at a European and national level. At international level, it classified the no-harm principle as shown in the following diagram.

Diagnosis of the No-Harm Principle in legal relations



In addition, it refers to the ongoing discussions within the Human Rights Council to develop the human rights principles in relation to climate change.

At the European and national level, the report focuses on how there is so much vertical integration that law making at national level is closely integrated with European law and that these cannot be seen as independent processes.
It concludes that there is a vast array of unaddressed legal issues (see Box. 1). These are summed up below:

- In respect of legal challenges at local through to global levels of governance, how can the notions of human rights, equity, liability, standard setting, policies, plans and instruments, conflict resolution, development cooperation, and emergency assistance be given concrete form? How can the development of such a strategy be made consistent with principles of democracy, legitimacy and the rule of law? Will there be friction between the need for flexibility and the need for predictability?
- In respect of legal challenges at the global, European and national level, how can the concepts of international liability, compensation and the right to development; as well as the institutions for implementing adaptation be further developed?

- In respect of legal challenges at the European Union level, what is the added value of legal measures at EU level and which sectors should it focus on? To what extent can the EU and Commission take retaliatory measures against non-EU countries to protect its interests in the area of adaptation?
- In respect of legal challenges at national level, what legal instruments are necessary to make existing infrastructure climate proof in the Netherlands? How do and can competing claims for spatial planning and water take into account the impacts of climate change?
- In respect of questions on administrative scale, which types of adaptation measures need legal intervention at which level of governance?

Box 1. Array of Unanswered Legal Questions

5.1 Questions relevant to global through to local levels of governance:

1. Rights, adaptation and climate change: At local to national level, the issues include the human right to a healthy environment. While in the Netherlands there is discussion about rights with respect to environmental risks, in Nigeria and India the human right to a healthy environment is part of the national constitutions. At European Union level, this too probably plays an important role. At international level, the case before the Inter-American Commission on Human Rights demonstrates that Human Rights and their relationship to climate change is a critical issue. Research questions flowing out of this approach include:
   a. How does climate change affect the human rights of individuals and can breach of human rights be invoked as a means to seek injunctive or compensatory relief from governments?
   b. To what extent is there consistency in the way human rights to a safe environment are dealt with at local through to global level?
   c. Since the impacts of climate change are unpredictable, a key issue of relevance is – What is the role of the Constitution and principles at national and international level in dealing with such uncertainty and in allocating risks between different segments of society?
   d. How can legal scholarship contribute to improving the understanding of the relationship between climate change and human rights?
2. Equity: At local, sectoral and national level a key issue is whose rights are protected and how are rights and responsibilities divided within society? The same issue plays a critical role at European and International level. At international level, this is captured under the principle of Common but Differentiated Responsibility. Research questions flowing out of this approach include:
   a. What legal principles determine the distribution of rights and responsibilities, of benefits and burdens or risks between social actors at the national, supranational and international level?
   b. How can these principles be operationalised in the context of adaptation?
   c. How can and should the precautionary principle be interpreted within the legal climate change regime?
3. Standard setting: Climate change adaptation calls for a range of different types of measures – some proactive and long-term; some ad hoc and short-term. The critical issue is whether existing legislation provides room for all the different types of measures or whether it stands in the way of different legislation types. Is law capable of taking into account uncertainties? Questions that flow from this could include:
   a. Does the common law system allow more flexibility in dealing with ad hoc adaptation challenges than the civil law system? Does the civil law system allow more flexibility in dealing with proactive adaptation policy?
   b. To what extent do existing laws constrain the ability of society from taking autonomous measures to cope with climate change?
   c. Under what conditions do supranational laws such as the European Union's *acquis communautaire* stand in the way of sensible local adaptive policies? What sort of legislative efforts hinder adaptation and what support adaptation measures?
4. Policies, plans and instruments: In the climate change arena, a number of initiatives are being taken by policymakers such as the water and climate assessment in the

Netherlands. It is not often clear what the legal status of these policies are, whether they meet legal principles adopted at that administrative level and whether they are open and flexible enough. For example, the introduction of partial emissions trading in the Kyoto Protocol may not necessarily be in line with the principles in the Climate Change Convention. Questions that arise from this include:

   a. To what extent do adaptation policies, plans and instruments embody legal principles and criteria implicitly and explicitly? To what extent do these instruments implicitly legitimise new principles?

5. Conflict resolution: As the impacts of climate change become more and more severe, and as more and more people and countries become victims to the impacts of climate change, conflicts may arise. Questions that arise from this include:
   a. How can the rules of access to domestic and international courts provide legal relief to individuals affected by climate change?
   b. How can Article 13 and 14 in the climate change treaty be further developed to address conflicts with respect to adaptation?
6. Aid and climate change: Increasingly climate change is being 'mainstreamed' into aid. Legal questions in this area include:
   a. How can the term 'new and additional' be interpreted? Can new and additional in a legally binding treaty refer to a commitment above a soft law commitment of 0.7% aid with respect to GNI ?
   b. Does mainstreaming climate change in aid violate or support the legal commitment to provide assistance for development issues?
7. Climate change may bring uncertain impacts in different parts of the world leading to emergency measures. The question is:
   a. What legal instruments at the different levels of governance will determine how best to provide emergency assistance?
   b. To what extent are governments liable for poor emergency help?
   c. Will the provision of public information absolve the government of responsibility with respect to damage caused by the impacts of climate change?
8. The rapid speed with which climate change takes place and the intensity of its impacts may call for a rapid adaptive strategy. How can the development of such a strategy be made consistent with principles of democracy, legitimacy and the rule of law?
9. How do classic legal ideas of protection of rights and legal certainty relate to the need for flexible responses to deal with climate change? Will there be friction between the need for predictability and for flexibility? Will this affect the integrity of the law?

5.2 Questions with respect to the global level

1. The no-harm principle and liability: Although the no-harm principle limits the sovereign rights of states to take action within their national borders, this principle still has to be elaborated further in political documents. This raises questions such as:
   a. What are the existing developments in international law with respect to the no-harm principle and state liability/responsibility with respect to the impacts of climate change? How can responsibility be shared between countries and what does this mean in terms of raising resources for compensation?
   b. How can and should the precautionary principle be interpreted within the climate change convention?
   c. Is the adoption of the leadership concept as opposed to the polluter pays or liability concepts an effective way towards generating the resources needed for adaptation?
   d. What is the extent of the legally binding commitments of the developed countries with respect to financial assistance for adaptation to the developing countries?
   e. Can states be held responsible for acts permitted by an international treaty, even if they cause harm to others?
2. The right to development: In the 1970s and 80s developing countries have argued in favour of the right to development. This point was also recognised in the Climate

Change Convention. This raises the question:
   a. To what extent does the right to development principle limit the liability of developing countries or countries with economies in transition in the area of climate change?
3. Right to compensation: More than 150 non-developed countries will be among those who are likely to be impacted by climate change. This raises the questions:
   a. Which legal principles will determine which projects/ sectors within and between developing countries have a right to compensation for the impacts suffered and to take adaptation measures in advance?
   b. How can such allocation principles be developed in a legally sound and legitimate manner?
   c. How can the right to development and climate change law be effectively linked together?
   d. How are legal powers, mandates and responsibilities divided between actors and how do they cooperate with each other?
4. The role of the GEF in adaptation
   a. How is an appropriate organisation for the disbursement of adaptation resources to be created? Is the GEF an appropriate mechanism given its record in the area of adaptation?

5.3 Questions with respect to the European level

If climate change adaptation regulations are taken at global and national level, a critical issue is:

1. What is the added value of EU level legislative action on adaptation?
2. In which sectors should the EU adaptive legislation focus on?
3. In what way should EU legislation itself be adapted to provide support for adaptation measures?
4. To what extent can the EU and Commission take retaliatory/punitive (e.g. trade) measures with non-EU countries to protect its interests in the area of adaptation?

5.4 Questions with respect to the national level

The Netherlands has always had to cope with the threats from the sea. Climate change brings the new threat of a rising sea level as well as other potential impacts. A number of measures are being taken by the Netherlands Government to deal with climate change. Relevant legal questions include:

1. Will the transfer of responsibility to the individual level as is currently taking place in the Netherlands absolve state responsibility?
2. What legal instruments are necessary to make existing infrastructure in the Netherlands climate proof?
3. How can future infrastructure and services be made subject to a climate and water ‘check’ ‘standard’ assessment?
4. How can access to national courts further develop the notion of liability to climate change and compensation for adaptation measures?
5. How do competing claims for spatial planning take into account the impacts of climate change?
6. Are exceptional clauses in national policies capable of providing the flexibility needed to take action?
7. How can rapid policies be taken at different administrative levels in order to respond adaptively to climate change? How can procedures be bundled to reach quick decisions? Can individual rights be set aside in the public interest?

5.5 Questions on administrative scale

1. Adaptation measures will eventually have to be taken at all administrative levels; but while they need to be complementary, they do not always need action at all levels simultaneously. The question is:
   a. Which types of adaptation measures need legal interventions at which level of governance?

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7. References

Adams, T.B., 2003: Is there a Legal Future for Sustainable Development in Global Warming? Justice, Economics and Protecting the Environment. Georgetown International Environmental Law Review, 16, pp. 77-122.

Adger W.N., N.W. Arnell and E.L. Tompkins, 2005a:Adapting to climate change: perspectives across scales, in: Global environmental change, nr. 2, pp. 75-76.

Adger, W.N. e.a.,2005: Succesful adaptation to climate change across scales, Global Environmental Change, nr. 15, pp. 77-86 (i.h.b. pp. 79-80).

Anand, R., 2004: International Environmental Justice: A North-South Dimension, Ashgate, Aldershot, UK.

Bals, C., Warner, K. & Butzengeiger, S., 2006: Insuring the Uninsurable: Design Options for a Climate Change Funding Mechanism. Climate Policy, 6(6), pp.637-647.

Barnett, J. & W.N. Adger, 2003: Climate dangers and Atoll countries. Climate Change, 61, pp. 321-337.

Batruch, C., 1998-9: Hot Air as Precedent for Developing Countries? Equity Considerations. UCLA Journal of Environmental Law and Policy, 17, pp.45-66.

Bausch Camilla & Michael Mehling, 2006: 'Alive and Kicking': The First Meeting of the Parties to the Kyoto Protocol, in: Review of European Community & International Environmental Law, nr. 2, pp. 193-201.

Berber, F.J., 1959: Rivers in International Law. Oceana Publications, London.

Birnie, P.W. & A. E. Boyle, 2002: International Law & the Environment (2nd ed.). Oxford University Press, New York.

Bodansky, D., 1993: The United Nations Framework Convention on Climate Change: A Commentary. Yale Journal of International Law, 18, pp. 451-588.

Boeters e.a., Post-2012 Climate Policy Scenarios, Bilthoven 2007.

Bouwer, L.M. & C.J.H. Aerts, 2006: Financing Climate Change Adaptation. Disasters, 30(1), pp. 49-63.

Buuren, P.J.J. van, A.A.J. de Gier, A.G.A. Nijmeijer en J. Robbe 2008:, Van Wro naar Wro, Instituut voor Bouwrecht, Den Haag, p. 203-228

Cazorla Marina & Michael Toman 2000:, International Equity and Climate Change Policy, Climate Issue Brief No. 27, Recourses for the Future.

Chalifour Nathalie J., Patricia Kameri-Mbote, Lin Heng Lye, John R. Nolon (eds.)2007:, Land use law for sustainable development, Cambridge University Press, Cambridge.

Coase, R., 1960: The Problem of Social Cost. Journal of Law and Economics, 3.

Cohen S., 1998:Climate Change and Sustainable Development: Towards Dialogue, in: Global Environmental Change nr. 2, pp. 341-371.

Cook, R. & E. Tauschinsky 2008: Accomodating human values in the climate regime, Utrecht Law Review 2008, www.utrechtlawreview.org.

COP 13 Decision on Additional Guidance to the Global Environment Facility, see http://unfccc.int/files/meetings/cop_13/application/pdf/cp_guid_gef.pdf

Cullet, P., 2007: Liability and redress for human-induced global warming: towards an international regime. Stanford journal of international law, 43 (1), pp. 99-121.

Driessen, P.P.J. & De Gier, A.A.J., 1997: Uit nood geboren, Evaluatie van de Deltawet grote rivieren, Vuga, Den Haag.

Driessen, P.P.J. De Gier, A.A.J. en Wiering, M.A., 1999: Versterking van rivierdijken, Bestuurlijk-juridische evaluatie van de Wet op de waterkering, Ministerie van Verkeer en waterstaat, Den Haag.

Driessen, P.P.J., 2008: Klimaatadaptatie, verevening en compensatie, paper geschreven in het kader van de Definitiestudie Afwegingskader Klimaatbestendigheid, in opdracht van Leven met Water, Klimaat voor Ruimte, Kennis voor Klimaat en Haboforum.

EC COM 2000: Commissie van de Europese Gemeenschappen aan de Raad, het Europees Parlement en het Economisch en Sociaal Comité over Prijstelling als beleidsinstrument voor een duurzame benutting van de waterreserves, Brussel 26 juli 2000, COM(2000) 477 definitief

EC COM, 2007: Building a Global Climate Change Alliance between the European Union and poor developing countries most vulnerable to climate change. 540 final, 18.9.2007.

EC COM, 2007a: Council Conclusions on a Global Climate Change Alliance, 2831st External Relations Council meeting, Brussels, 19-20 November 2007.

EC COM 2007b: Green Paper from the Commission to the Counsel, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, Adapting to Climate Change in Europe – Options for EU Action, SEC (2007) 849, COM (2007) 354

EC COM, 2007c: Commissie van de Europese Gemeenschappen, Mededeling van de Commissie aan het Europees Parlement en de Raad, De aanpak van waterschaarste en droogte in de Europese Unie, Brussel, 18 juli 2007, COM(2007) 414 definitief.

Evans Meredydd, Susan Legro and Ilya Popov, 2000: The Climate for Joint Implementation: Case Studies from Russia, Ukraine, and Poland, in: Mitigation and adaptation strategies for global change, nr. 4, pp. 319-336.

Faure, M.G. and Nollkaemper, A., 2007: International Liability as an instrument to prevent and compensate for climate change. Stanford Journal of International Law, 43, pp. 123-179.

Foster, C., 2005: The ILC Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising out of Hazardous Activities: Privatizing Risk? RECIEL, 14(3), pp. 265-282.

Gardiner, S.M., 2004: Ethics and Global Climate Change. Ethics, 114, pp.555-600.

Gee, D. & Vaz, S.G., 2001: Late lessons for early warnings: the precautionary principle 1896-2000. European Environment Agency, Copenhagen.

Gilissen, H.K., 2008: Grensoverschrijdende samenwerking binnen het waterbeheer, Klinkt het waterakkoord ook over de Nederlandse grens?, Utrecht.

Goldenman Gretta, 1990: Adapting to climate change : a study of international rivers and their legal arrangements, in: Ecology Law Quarterly, nr. 4, pp. 741-802.

Grasso Marco, 2006: An Ethics-based Climate Agreement for the South Pacific Region, in: International Environmental Agreements: Politics, Law and Economics nr. 3, pp. 249-270.

Groothuijse, F.A.G., 2007: De aanleg of wijziging van waterstaatswerken volgens het wetsvoorstel Waterwet, Bouwrecht, p. 307 e.v.

Gupta J. (1998). Leadership in the Climate Regime: Inspiring the Commitment of Developing Countries in the Post-Kyoto Phase, Review of European Community and International Environmental Law, 7(2), pp. 178-188.

Gupta J., 1998: Leadership in the Climate Regime: Inspiring the Commitment of Developing Countries in the Post-Kyoto Phase, Review of European Community and International Environmental Law, 7(2), pp. 178-188.

Gupta, J. (1995). The Global Environment Facility in its North-South Context, Environmental Politics,[18] 4(1), pp.19-43.

Gupta, J., 1997: The Climate Change Convention and Developing Countries - From Conflict to Consensus? Environment and Policy Series, Kluwer Academic Publishers, Dordrecht, the Netherlands.

Gupta, J., 2007: Legal Steps Outside the Climate Convention: Litigation as a Tool to Address Climate Change. RECIEL, 16, pp. 76–86.

Gupta, J., 2007a: De Rol van China en India in het Mondiale Klimaat Beleid, Nederlands Juristenblad, 45-46, pp. 2888-2892.

Gupta J.,2007a, Climate Change and International Relations: Urgent Challenges Anno 2007, in: Klimaatverandering en de rol van het milieurecht, VMR 2007, nr. 6, Boom Juridische uitgevers, Den Haag 2007, pp. 17-28.

Gupta J., 2007b, Legal Steps Outside the Climate Convention: Litigation as a Tool to Address Climate Change, in: Review of European Community & International Environmental Law 2007, nr. 1, pp. 76-86.

Gupta, J., 2007c: The multi-level governance challenge of climate change, Environmental Sciences, 4 (3), pp. 131-137.

Gupta, J., 2008: Global change: analyzing scale and scaling in Environmental Governance, in Young, O., King L. and Schroeder, H. (Eds.), Institutions and environmental change: principal findings, applications and research frontiers, MIT Press, Cambridge, MA.

Halvorssen, 2007: Common, but Differentiated Commitments in the Future Climate Change Regime – Amending the Kyoto Protocol to Include Annex C and the Annex C Mitigation Fund, in: Colorado Journal of International Environmental Law and Policy, pp. 247 ev.

Hansjürgens Bernd & Ralf Antes, 2008: Economics and management of climate change: risks, mitigation and adaptation, Springer, New York

Hey, E. en Van Rijswick, H.F.M.W., 2007: Stroomgebiedbenadering als impuls voor transnationaal waterbeheer: De Kaderrichtlijn water en de verhouding tot internationale verdragen, Tijdschrift voor Omgevingsrecht 3

Heiden, Erb & Sieker (red), 2001: Hochwasserschutz heute – Nachhaltiges Wassermanagement, Erich Schmidt Verlag.

Höhne N., 2006: What is next after the Kyoto Protocol? Assessment of Options for International Climate Policy Post-2012, Amsterdam

Holling, C.S., Folke, C., Carpenter, S., Elmqvist, T., Gunderson L. and Brian Walker, 2002: Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. Ambio, 31(5), pp. 437-440.

[18] B journal Ceres research School

Houghton J.T., 2004: Global Warming: The Complete Briefing, Cambridge University Press, Cambridge.

Ierland E.C. van, J. Gupta and M.T.J. Tok, 2003: Issues in International Climate Policy, Theory and Policy, Edward Elgar Publishing Ltd., Cheltenham

Ikeme, J., 2003: Equity, environmental justice and sustainability: incomplete approaches in climate change politics. Global Environmental Change, 13, pp. 195-206.

IPCC WG I, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.

IPCC WG II, 1996: Climate Change 1995: Impacts, Adaptations, and Mitigation of Climate Change, Cambridge University Press, Cambridge.

IPCC WG II, 2001: Climate Change 2001: Impacts, Adaptation and Vulnerability Cambridge University Press, Cambridge.

IPCC WG II, 2007: Climate Change 2007: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.

IPCC WG II, 2007: Climate Change 2007: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.

IPCC WG III, 1990: Climate Change: The IPCC Response Strategies, UNEP and WMO.

IPCC WG III, 2007, Climate Change 2007: Mitigation of Climate Change, Contribution of Working Group III to the Fourth Assessment Report of Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.

Jones Roger N., Paul Dettmann, Geoff Park, Maureen Rogers & Terry White, 2007: The relationship between adaptation and mitigation in managing climate change risks: a regional response from North Central Victoria, Australia, in: Mitigation and Adaptation Strategies for Global Change, nr. 5, pp. 685-712.

Kane Sally & Jason F. Shogren, 2000: Linking Adaptation and Mitigation in Climate Change Policy, in: Sally M. Kane, Gary Wynn Yohe (eds.), Societal Adaptation to Climate Variability and Change, Kluwer Academic Publishers, pp. 75-102.

Kane Sally M.. & Gary Wynn Yohe (eds.) 2000:, Societal Adaptation to Climate Variability and Change, Kluwer Academic Publishers.

Kaniaru, D. Shende, R., Stone, S. & Zaelke, D., 2007: Strengthening the Montreal Protocol: Insurance against Abrupt Climate Change. Sustainable Development Law & Policy, 7, pp. 3-9.

Keessen, A.M. & H.F.M.W. van Rijswick, 2008: Klimaatverandering en de bescherming van schaars water: regulering van watergebruik bij watertekorten in het Europese en Nederlandse waterrecht, preadvies voor de Vereniging voor milieurecht, werkgroep Klimaatverandering en rechtsontwikkeling, the report will be published in 2009, see www.milieurecht.nl

Kelly P.M. & W.N. Adger 2000: Theory and Practice in Assessing Vulnerability to Climate Change and Facilitating Adaptation, in: Mitigation and Adaptation Strategies for Global Change 2000, nr. 4, pp. 325-352.

Klein R.J.T., R.J. Nicholls & N. Mimura, 1999: Coastal Adaptation to Climate Change: Can the IPCC Technical Guidelines be applied?, in: Mitigation and Adaptation Strategies for Global Change, nr. 3-4, pp. 239-254.

Klein R.J.T., 2003: Adaptation to Climate Variability and Change: What is Optimal and Appropriate?, in: C. Giupponi and M. Schechter (eds.), Climate Change and the Mediterranean: Socio-Economic Perspectives of Impacts, Vulnerability and Adaptation, Edward Elgar Publishing Ltd., Cheltenham

Klein R.J.T., E.L. Schipper & S. Dessai, 2005: Integrating Mitigation and Adaptation into Climate and Development Policy: Three Research Questions, in: Environmental Science and Policy, nr. 8, pp. 579-588.

Klein R.J.T., S. Huq, F. Denton, T.E. Downing, R.G. Richels, J.B. Robinson & F.L. Toth, 2007: Interrelationships between adaptation and mitigation, in: M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds.), Climate Change 2007: Impacts, Adaptation and Vulnerability, Cambridge University Press, Cambridge.

Lacasta, Dessai & Powroslo, 2002: Consensus Among Many Voices: Articulating the European Union's Position on Climate Change, in: Golden Gate University Law Review, pp. 351 ev.

Larmuseau, 2007: Constitutional rights to an ecologically balanced environment, Flamisch Association for Environmental Law, 2007.

Maak ruimte voor klimaat. Nationale adaptatiestrategie – de interbestuurlijke notitie. Gezamenlijk rapport van VROM, V&W, LNV, EZ, IPO, VNG en Unie van Waterschappen

Mace, M.J., 2005: Funding for Adaptation to Climate Change: UNFCCC and GEF Developments since COP-7. RECIEL, 14(3), pp. 225-246.

McCarthy James J., Osvaldo F. Canziani, Neil A. Leary, David J. Dokken & Kasey S. White (eds.), 2001: Climate Change 2001: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change.

McEvoy D., K. Lonsdale & P. Matczak 2008: Adaptation and Mainstreaming of EU Climate Change Policy: An Actor-Based Perspective, in: Centre for European Policy Studies, Policy brief, nr. 149, pp. 1-14.

MEA (Millennium Ecosystem Assessment), 2005: Ecosystems and Human Well-Being: Scenarios, Volume 2. Carpenter, S.R., Pingali, P.L., Bennett, E.M. and Zurek, M.B. (Eds). Island Press, Washington.

Mehling M. & L. Massai, 2007: The European Union and Climate Change: Leading the Way towards a Post-2012 Regime?, in: Carbon an Climate Law Review , nr. 1, pp. 45-52.

Melkas Eriika, 2002: Sovereignty and Equity within the Framework of the Climate Regime, in: Review of European Community & International Environmental Law, nr. 2, pp. 115-128.

Metz Bert, 2005: Climate policy options post-2012 : European strategy, technology and adaptation after Kyoto, Earthscan, London 2005.

Michel David (ed.)2003:, Climate Policy for the 21th Century: Meeting the Long-Term Challenges of Global Warming, Centre for Transatlantic Relations, Johns Hopkins University, Washington D.C. 2003.

Möhner, A. & Klein, R.T.J., 2007: The Global Environment Facility: Funding for Adaptation or Adaptation to Fund? Stockholm Enviroment Institute - Climate and Energy Programme.
Milieu en Natuur Planbureau 2007:, De betekenis van het EU groenboek klimaatadaptatie voor Nederland, MNP report 500094004, November 2007, p. 5 en 6.

Müller, B. & Hepburn, C., 2006: IATAL – An Outline Proposal for an International Air Travel Adaptation Levy. Available at: http://adamproject.eu/dmdocuments/mueller&hepburn_2006_ecbi.pdf (accessed 30 September 2007).

Müller, B., Drexhage, J., Grubb, M., Michaelowa, A. & Sharma, A., 2003: Framing Future Commitments: A Pilot Study on the Evolution of the UNFCCC Greenhouse Gas Mitigation Regime. Oxford Institute for Energy Studies, Oxford, UK Available at: http://www.oxfordenergy.org/pdfs/EV32.pdf (accessed 30 September 2007).

Nollkaemper, A.& M. Faure, 2007: International liability as an instrument to prevent and compensate for climate change, Stanford international law journal, June 2007, p. 124-176.

Oberthür, S., 2006: The Climate Change Regime: Interactions with ICAO, IMO, and the EU Burden-Sharing Agreement. In: Oberthür, Sebastian and Thomas Gehring (Eds.), Institutional Interaction in Global Environmental Governance.Synergy and Conflict among International and EU Policies. pp. 53-77. The MIT Press, Cambridge, MA, USA.

OECD, 1974: The Implementation of the Polluter Pays Principle. OECD, Paris.

Okoth-Ogendo H.W.O., 2007: Climate Change Adaptation and Mitigation : Exploring the Role of Land Reforms in Africa, in: Nathalie J. Chalifour, Patricia Kameri-Mbote, Lin Heng Lye, John R. Nolon (eds.), Land use law for sustainable development, Cambridge University Press, Cambridge 2007, pp. 60-70.

O'Riordan Tim & Andrew Jordan, 1996: Social Institutions and Climate Change, in: Tim O'Riordan and Jill Jäger (eds.), Politics of Climate Change: A European perspective, Routledge 1996, pp. 65-105

O'Riordan Tim & Jill Jäger (eds.), 1996: Politics of Climate Change, A European perspective, Routledge 1996.

Oxfam International, 2007: Adapting to Climate Change – What is needed in poor countries and who should pay. Oxfam Briefing Paper 104. Oxfam International, Oxford, UK. Available at: http://www.oxfam.org/en/files/bp104_climate_change_0705.pdf/download (accessed 30 September 2007).

Paavola J. & W.N. Adger, 2006: Fair adaptation to climate change, in: Ecological Economics 2006, nr. 4, pp. 594-609.

Paavola J. & W.N. Adger, 2002: Justice and adaptation to climate change, Tyndall Centre for Climate Change Research, October 2002.

Pallemaerts M., 1999: The Decline of Law as an Instrument of Community Environmental Policy, in: Law & European Affairs 1999, pp. 338 ev.

Pallemaerts, M. & R. Williams, Climate Change: The international and European policy framework
Parry, M.L., O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds.), 2007: Climate Change 2007: Impacts, Adaptation and Vulnerability, Cambridge University Press, Cambridge 2007.

Peeters, M. & K. Deketelaere (red.), 2006: EU Climate Change Policy, Edward Elgar Publishing Ltd., Cheltenham 2006

Pilifosova O., Where is Adaptation Going in the UNFCCC?, in: A.C. de la Vea-Leinert, R.J. Nicholls and R.S.J. Tol (eds.), Proceedings of SURVAS Expert

Prato Tony, 2008: Accounting for risk and uncertainty in determining preferred strategies for adapting to future climate change, in: Mitigation and adaptation strategies for global change 2008, nr. 1, pp. 47-60.

Rajamani, L., 2000: The principle of common but differentiated responsibility and the balance of commitments under the climate regime. RECIEL, 9(2), pp. 120-131

Ramnewash-Oemrawsingh, S.T. & T.P. de Kramer (red.) 2006: Rechtsontwikkeling en klimaatverandering anno 2005, Vereniging voor Milieurecht 2006/4 , BJu 2006

Rijswick, H. van, 2008: Moving water and the Law, inaugural adress, Europa Law Publishing, Groningen 2008

Rijswick, H. van, (red), 2008: EG-recht en de praktijk van het waterbeheer, STOWA 2008,

Sands, P., 1992: The United Nations Framework Convention on Climate Change, RECIEL, 1(3), pp. 270-277.

Schipper E.L.F., 2006: Conceptual History of Adaptation in the UNFCCC Process, in: Review of European Community & International Environmental Law 2006, nr.1, pp. 82-92.

Schipper Lisa & Ian Burton, 2008: The Earthscan reader on adaptation to climate change, Earthscan, London 2008.

Schneider Stephen & Jose Sarukhan, 2001: Overview of Impacts, Adaptation, and Vulnerability to Climate Change, in: Climate Change 2001: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change 2001, pp. 77-103.

Schröder, M., 1996: Sustainable development and Law (oratie Universiteit Utrecht),.E.J. Tjeenk Willink, 1996

Smit B. and O. Pilifosova, 2001: Adaptation to Climate Change in the Context of Sustainable Development and Equity, in: Climate Change 2001: Impacts, Adaptation, and Vulnerability, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change 2001, pp. 877-912.

Shue, H., 1999: Global Environment and International Inequality. International Affairs, 75, pp. 531-545Stockholm Declaration, 1972.

Smith, J., R. Klein & S. Huq (red.), 2003: Climate Change Adaptive Capacity and Development, Imperial College Press, London 2003

Sopoaga, E., Greyling, L., Lesolle, D., Massawa, E. & Miguez, J., 2007: On the Road to Bali: Operationalising the Kyoto Protocol Adaptation Fund. International Institute for Environment and Development (IIED). Available at: http://www.eurocapacity.org/downloads/IIED-ecbi_AF_2007 (accessed 5 November 2007).

Solf, S., 2006: Europäisches Flussgebietsmanagement und deutsche Wasserwirtschaftsverwaltung, zur rechtlichen Umsetzung des Art.3 Wasserrahmenrichtlinie, Erich Schmidt Verlag, Berlin 2006.

Spier, J.,2007: Civielrechtelijke aansprakelijkheid voor klimaatverandering, doemscenario's voor onverantwoordelijke bedrijven en overheden, in: J.H.G. van den Broek e.a., Klimaatverandering en de rol van het milieurecht, Vereniging voor Milieurecht, Boom Juridische uitgevers, Den Haag 2007, pp. 39-50.

Sterk e.a., 2007: The Nairobi Climate Change Summit (COP12/MOP 2): Taking a Deep Breath before Negotiating Post-2012 Targets?, in: Journal for European Environmental and Planning Law 2007, pp. 140 ev.

Stern, N., 2006: The Stern Review: The Economics of Climate Change. HM Treasury, London.

Stone, 2004: Common but Differentiated Responsibilities in International Law, American Journal of International Law 2004, pp. 276 ev.

Sugiyama Taishi & Jonathan Sinton, 2005: Orchestra of Treaties : A Future Climate Regime Scenario with Multiple Treaties among Like-minded Countries, in: International Environmental Agreements: Politics, Law and Economics 2005, nr. 5, pp. 65-88.

Teesing, N, (red.) 2007: Klimaatverandering en de rol van het recht, BJU 2007

Thomas, D.S.G. & C. Twyman, 2005: Equity and justice in climate change adaptation amongst natural-resource-dependent societies, Global Environmental Change 2005, nr. 15, pp. 115-124

Tol, R.S.J. & Verheyen, R., 2004: State Responsibility and Compensation for Climate Change Damages – a Legal and Economic Assesment. Energy Policy, 32(9), pp. 1109-1130.

Trouwborst, A., 2007: The Precautionary Principle in General International Law: Combating the Babylonian Confusion. RECIEL, 16(2), pp. 185-195.

Tuvalu, 2007: Speech of the Deputy Prime Minister of Tuvalu at the UN High Level Meeting on Climate Change on 29 September 2007, http://www.tuvaluislands.com/un/2007/un_2007-09-29.html (accessed 5 November 2007).

UNFCCC, 1992: The United Nations Framework Convention on Climate Change.

Verhagen A., 2002: Climate change in the Netherlands: consequences and adaptation options: final report of the second phase of the Dutch National Research Programme on Global Air Pollution and Climate Change (NRP II) 1995-2001, NRP programme Office, Bilthoven 2002

Verheyen, R., 2002: Adaptation to the Impacts of Anthropogenic Climate Change – The International Legal Framework. RECIEL, 11(2), pp. 129-143.

Verheyen R., 2005: Climate Change Damage and International Law, Prevention Duties and State Responsibility, Martinus Nijhoff Publishers 2005.

Verschuuren, J.M., 2005: Naar integratie van de waterwetgeving: het voorontwerp waterwet, Tijdschrift voor Omgevingsrecht 2005/4

Verschuuren J.M., 2007: Adaptatie aan klimaatverandering vraagt om adaptatie van de wet, in: NJB 2007,
nr. 45/46, p. 2880.

Voigt, C., 2008: State Responibility for Climate Change Damages. Nordic Journal of International Law, 77, pp. 1-22.

Weiss Charles, 2003: Scientific Uncertainty and Science-Based Precaution, in: International environmental agreements: politics, law and economics 2003, nr. 2, pp. 137-166.

Weisslitz Michael, 2002: Rethinking The Equitable Principle Of Common But Differentiated Responsibility: Differential Versus Absolute Norms Of Compliance And Contribution In The Global Climate Change Context, Colorado Journal of International Environmental Law and Policy, 13, pp.473-509.

Wells Alan, 2007: Climate Change: The Final Countdown (part I and II), in: European Environmental Law Review 2007, nrs. 3 and 4, pp. 62-65 and 93-95.

Wells Allan, 2007: Climate Change: A looming humanitarian catastrophe, in: European Environmental Law Review 2007, nr. 6, pp. 160-162.

Wilbanks T.J. e.a., 2003: Possible Responses to Global Climate Change: Integrating Mitigation and Adaptation, in: Environment 2003, nr. 5, pp. 28-38.

Wilbanks Thomas J. & Jayant Sathaye, 2007: Integrating mitigation and adaptation as responses to climate change: a synthesis, in: Mitigation and Adaptation Strategies for Global Change 2007, nr. 5, pp. 957-962.

Wilbanks Thomas J., Paul Leiby, Robert Perlack, J. Timothy Ensminger & Sherry B. Wright, 2007: Toward an integrated analysis of mitigation and adaptation: some preliminary findings, in: Mitigation and Adaptation Strategies for Global Change 2007, nr. 5, pp. 713-725.

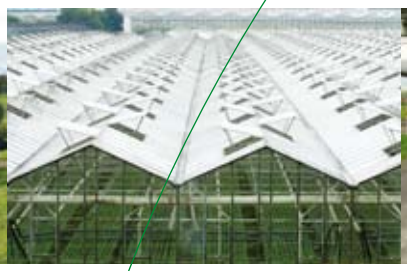
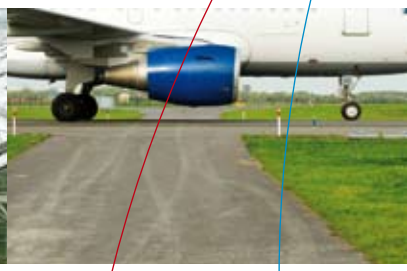
Wilson Elizabeth, 2006: Adapting to Climate Change at the Local Level: The Spatial Planning Response, in: Local environment 2006, nr. 6, pp. 609-626.

Woldendorp, H.E., 2008: De normstelling volgens de Kaderrichtlijn water: Nederland opnieuw op slot? (1), Bouwrecht 2008/6, p. 35 e.v. en (2), Bouwrecht 2008/37, p. 178 e.v.

Workshop on European Vulnerability and Adaptation to Impacts of Accelerated Sea-Level Rise (ASLR), Flood Hazard Research Centre, London 2000.

Yohe Gary & Kenneth Strzepek, 2007: Adaptation and mitigation as complementary tools for reducing the risk of climate impacts, in: Mitigation and Adaptation Strategies for Global Change 2007, nr. 5, pp. 727-739.



To develop the scientific and applied knowledge required for climate-proofing the Netherlands and to create a sustainable knowledge infrastructure for managing climate change

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