Environmental Protection in the European Union 4

Eike Albrecht
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*Editors*

# Implementing Adaptation Strategies by Legal, Economic and Planning Instruments on Climate Change

Springer

# Environmental Protection in the European Union

Volume 4

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# Implementing Adaptation Strategies by Legal, Economic and Planning Instruments on Climate Change

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# Foreword

The 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) published in 2014 consolidated the certainty that mankind will have to contend with significant challenges of climate change. In this regard, the reduction of greenhouse gas emissions is of fundamental significance. The Federal Republic of Germany has, through consistent promotion of electricity generation from renewable energies, contributed enormously to the transition to a non-fossil fuel energy generation. Particularly, through the creation of a large entry market for industrial mass production of alternative energy systems in Germany. Hence, the drastic drop in prices for photovoltaic systems of more than 70 % within a few years is a result of the massive amount of assistance from the German Renewable Energy Sources Act (EEG). Consumers in Germany have, through the EEG surcharge, exclusively financed the technological development and launching costs of these innovative, clean and unlimited sources of energy. Unfortunately, the number of countries that consistently try to reduce their greenhouse gas emissions is rather small. International commitments in the 2nd Commitment Period of the Kyoto Protocol have been received only from Australia, the EU and some other European countries. Meanwhile the time for effective mitigation measures is running out. Climate change is in full swing and will continue to worsen. In this respect, adaptation measures are essential. This book deals with the adaptation to climate change in different areas, regions and countries of the world and, thus, represents a significant contribution to possible adaptation measures, but, however, does not relieve the states of the world and its citizens from responsibility to reduce their emission of greenhouse gases. Sun and wind don't send us a bill. With the 100 % change of energy we can generate not only ecological advantages, but also economical profits. Germany is renewable, Europe is renewable, the world is renewable.

Franz Alt is a German journalist and author

# Foreword

Climate change is transforming the world we live in and coping with the changes is unavoidable. While preventing climate change from worsening must be a key priority, making sure we're ready to deal with the consequences is equally as pressing.

The latest reports by the International Panel for Climate Change (IPCC) are unequivocal. Action to reduce greenhouse gas emissions must be taken now to prevent more climate-related damages in the future. The EU has already taken bold measures: it is bound to overachieve its commitments under the Kyoto protocol and now observes the lowest emissions on record. But with only 10 % of the global emissions, the EU cannot act alone. All countries—large, small, developed, and developing—have a role to play and agree on a global agreement on climate change in 2015.

This book is testimony of what an all-encompassing and complex task is before us. Adaptation strategies are needed at all levels of governance and administration. Most measures will take place at the local, regional, and national levels to address the immediate impacts on our communities and ecosystem. On the other hand, transboundary effects of climate change—like when entire river basins are affected—make it clear that efforts also need to be stepped up at the European and international levels. Each of these levels has a specific role to play, but we can only tackle climate change efficiently if this is done in a coordinated manner. Countries and regions need to learn from one another and set up examples of good practices to guide new adaptation measures around the world.

Here, the EU's comprehensive adaptation strategy is a good example of how working together with all EU countries is helping us to strengthen our climate change defenses. The EU adaptation strategy adopted in April 2013 makes it easier for Member States to work on joint initiatives. It also makes sure that adaptation is considered when taking decisions in other policy areas like agricultural planning or construction of energy systems.

But of course, the EU is not alone. The contributions in this book give a good overview of adaptation initiatives from around the world and document best practices in different economic sectors. With input from a range of international

scholars and environmental experts, the book sheds light on current discussions on adaptation and outlines challenges to further global action.

Forewarned is forearmed, an old expression says. This holds especially true for climate change. The earlier we take action to prevent the risks of climate change, and the sooner we prepare to face its impacts now, the more we can avoid the damages to our environment and our society.

Connie Hedegaard

# Foreword

Humanity stands in an unthinkable moment in time, facing unequivocal climate change and an imminent threat of uncontrollable planetary heating. Policy responses pale in comparison to the magnitude of danger confronting global society. Though most leaders have set a goal of limiting Earth's temperature increase to 2 °C, actions taken thus far are grossly inadequate to meet that goal. Moreover, recent science indicates that even 2 °C heating may lead to disastrous consequences for human civilization, compromising the basic habitability of the planet.[1]

Alarmingly, carbon emissions from human activity have caused the global atmospheric carbon dioxide ($CO_2$) concentration to rise over 400 parts per million (ppm) in 2014—a concentration that has not been exceeded in millions of years.[2] Without a swift and ambitious global transition away from fossil fuels, atmospheric $CO_2$ concentrations could pass a cataclysmic threshold, triggering dangerous feedback loops that create "self-amplifying" climate change to which there is no

[1] James Hansen *et al. Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE e81648 (2013) (presenting science indicating need to restore the atmosphere to a $CO_2$ concentration of 350 ppm to maintain a planet that is conducive to human habitation). *See also* Brief for Scientists Amicus Group as Amici Curiae Supporting Plaintiffs-Appellants at 16, Alec L. v. McCarthy, No. 13-5192 (D.C. Cir. Nov. 12, 2013) ("Effective action remains possible, but delay in undertaking sharp reductions in emissions will undermine any realistic chance of preserving a habitable climate system, which is needed by future generations no less than by prior generations."), *available at* http://ourchildrenstrust.org/sites/default/files/FiledScienceAmicus.pdf; *see also* Joel Smith *et al.*, *Assessing Dangerous Climate Change Through an Update of the International Panel on Climate Change (IPCC) "Reasons for Concern*," 106 Proceedings of the National Academy of Sciences 4133 (2008).

[2] For interpretation, *see* "*NASA Scientists React to 400 ppm Carbon Milestone*," NASA, GLOBAL CLIMATE CHANGE, http://climate.nasa.gov/400ppmquotes/; Mark Fischetti, "*2-Degree Global Warming Limit is Called a 'Prescription for Disaster*,'" SCIENTIFIC AMERICAN BLOG (Dec. 6, 2011). http://blogs.scientificamerican.com/observations/2011/12/06/two-degree-global-warming-limit-is-called-a-prescription-for-disaster/.

practical prospect of adaptation.[3] The future well-being of the world's youth and their descendants hinges on present society's willingness to redefine and reconstruct the current disaster-track socioeconomic structure.

While slashing carbon emissions stays crucial, the concomitant challenge of adaptation becomes imperative in response to the climate chaos already under way. Due to the carbon pollution remaining in the atmosphere from prior emissions, there exists heating "in the pipeline" that cannot be called back. As economist Thomas Friedman states, a climate approach must both "manage what is unavoidable and avoid what is unmanageable."[4] Managing the unavoidable (the climate change already occurring) is known as *adaptation*, while avoiding what is unmanageable (lowering carbon emissions to stave off global catastrophe) is known as *mitigation*. This volume focuses on the adaptation challenge by providing a pragmatic and analytical approach to managing impacts from global warming.

The degree of change faced by humanity may be nearly unfathomable to decision makers operating in a context of industrialized society that has enjoyed relatively stable climate conditions. The average global temperature in 2012 was only 0.85 °C warmer than what it was in 1880.[5] To a layperson, this may sound negligible. However, five times as many natural disasters—including floods, hurricanes, droughts, and wildfires—occurred during 2001–2010 as compared with 1971–1980.[6] Rising sea levels, extreme water scarcity, ferocious storms, and plummeting crop yields are already destroying human communities and causing deaths across the world. While different regions face different forms of upheaval, one thing is certain: there is no safe haven on the planet safe from global climate change. Projections indicate that by 2050, between 50 million and 350 million people could be forced to migrate due to the impact of global warming.[7] Climate change will literally redraw the geopolitical boundaries that presently exist.

The adaptation challenge calls forth the basic duty of government to provide for the safety and welfare of the people. Officials in countries throughout the world must rise to these unprecedented circumstances. Leaders today occupy a crucial moment in history, holding unparalleled responsibility for the welfare of both

[3] Durwood Zaelke, *As Climate Impacts Accelerate, Speed of Mitigation Becomes Key*, HUFFINGTON POST (July 15, 2014), http://www.huffingtonpost.com/durwood-zaelke/as-climate-impacts-accele_1_b_5588113.html.

[4] Thomas L. Friedman, *The Scary Hidden Stressor*, THE NEW YORK TIMES (Mar. 2, 2013), http://www.nytimes.com/2013/03/03/opinion/sunday/friedman-the-scary-hidden-stressor.html?_r=0.

[5] International Panel on Climate Change, 2013: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[6] World Meteorological Organization, *Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970—2012)*, WMO—No. 1123 (2014).

[7] United Nations, General Assembly, *Climate change and Its Possible Security Implications: Report of the Secretary-General*, A/64/350 (11 September 2009).

present and future generations of citizens. Today's crisis requires such leaders to act with vision and courage in face of uncertainty and turbulence. The impacts of climate change once considered distant possibilities are happening now, several generations earlier than indicated by even the most pessimistic predictions of the past. Leaders of today's world must learn to be proactive, rather than reactive. Entire coastlines sit vulnerable to rising seas, for example, a phenomenon that will destroy homes, flood entire cities, and unleash massive toxins from existing port facilities and nuclear plants situated near the ocean. A systematic relocation and preemptive cleanup will save lives, communities, and economies. But the challenge is immense, and society must act swiftly in the waning window of climate stability to accomplish such massive restructuring. The task ahead is to imagine the unimaginable and act in bold and effective ways based on the best available science and analysis—untainted by vested political and economic interests that have strong profit interests in assuring no change at all.

Ultimately, leaders must pursue adaptation and mitigation urgently as one integral goal. With smart planning, a community can fortify its ability to adapt to climate change while also accomplishing measurable carbon emission reduction. Rather than being mutually exclusive, the adaptation and mitigation goals can be—and in every case should be—jointly reinforcing and synergistic. This great societal transition should take shape around the basic aim of building local resilience and self-sufficiency by creating fossil-fuel free economies. This effort will entail unraveling many of the economic systems that perpetuate dependency on distant global markets and multinational corporations. Such an effort will require re-localizing food systems, creating local manufacturing systems, and designing transportation options independent of fossil fuels. Action on these levels should achieve significant co-benefits, by infusing local economies with investments and creating more political autonomy for communities. But the importance of lifestyle choices cannot be underestimated. If the world's youth are to inherit a habitable planet, citizens of developed nations must decide to reject high-carbon lifestyles that have become intolerably destructive, and citizens of developing nations must form a new vision that does not simply model the excesses of the industrialized world. In all cases, this re-envisioning of how we live and how we work requires willpower and imagination, but perhaps most of all the fortitude to challenge the entrenched assumptions governing our current decision-making processes.

This book provides a platform for building a concrete vision of local and global adaptation. It boldly confronts the imminent change facing humanity, yet its reasoned and practical approach allows readers to maintain the optimism and determination necessary to work towards a future with a habitable climate. It is designed for a broad range of readers, including educators, journalists, scientists, citizens, business entrepreneurs, religious leaders, and government officials. The challenge ahead calls forth people from all sectors of society to take initiative and innovate change in their own distinct realm of society. True pioneers in this pivotal age will create new systems and economies that improve the condition of humanity. But we must all act with extreme urgency. There is not a moment to lose.

Mary Christina Wood author of Nature's Trust: Environmental Law for a New Ecological Age Cambridge University Press, 2013 is the Philip H. Knight Professor of Law at the University of Oregon School of Law and serves as Faculty Director of the school's nationally ranked Environmental and Natural Resources Law (ENR) Program. She expresses gratitude for the contribution of Rance Shaw, Bowerman Fellow for the ENR Program's Conservation Trust Project.

Eugene, OR Mary Christina Wood

# Preface

Climate change is considered a fact; it is no longer an illusion and not seriously disputed. Its effects are global and can be experienced in different ways and in different intensities. Human activities have led to a significant increase in the concentrations of greenhouse gases in the atmosphere which enhances the natural greenhouse effect and leads to an additional warming of the average temperature of the earth's surface and the atmosphere. It is also a fact that the majority of greenhouse gases emitted worldwide in the past and in the present come from developed countries and that the per capita emissions are still relatively low in developing countries.

But the social needs for development will have to be satisfied. As a consequence the proportion of greenhouse gases emitted from developing countries will rise worldwide. Therefore, climate change will increase and the impact on natural ecosystems and on people will intensify. So it is not surprising that the upcoming changes in the climate of the earth and its adverse effects are met with concern by all humanity.

As varied as the causes and effects of climate change, so varied are the proposed solutions and approaches to deal with the problem and to do something against it. Taking into account the global character of climate change, a comprehensive global cooperation is called for that leads to an effective and appropriate international action—in accordance with the respective responsibilities, common but at the same time differing depending on the capabilities and the social and economic situation of the respective actors.

The 19 contributions to this book are presenting some ideas, approaches, and tools about the adaptation to climate change. In addition to (existing) legal instruments, these contributions also focus on the implementation of economic instruments and planning tools as well as their (further) development. Here, Wätzold shares with us the economic perspective on climate change adaptation while Afroz and Naser give an overview of global adaptation politics. Gawor portrays the advantages of the Life Cycle Assessment in climate change mitigation. Andrew Long discusses the possibilities of REDD+; Zschiegner and Wanki introduce the German Renewable Energy Source Act (EEG), whereas Burleson depicts the opportunities of innovation in climate change law.

Apart from the strategy to counteract climate change by avoiding emissions, the general approach to adapt to climate change is pursued as well. In this context, Camacho writes on the learning infrastructure in the United States' federal system while Send, Riedel, and Hansch identify the role of crowdsourcing in climate change politics.

The responsibility of dealing with the effects of climate change is identified as a central theme by Piroch (liability for damage caused by climate change), Krause and Egute (risk management and climate change), as well as Mißler-Behr and Mehicic (strategy development and risk management in emission rights trading).

A number of articles deal with country-specific problems related to climate change and the respective possible adaptation strategies. The countries in focus are the Netherlands (Gupta, Klostermann, Bergsma, and Jong), Nigeria (Ogbonna), Syria (Ibrahim), and—treated in three different articles—Cameroon (Somah and Schmidt, Lambi and Kometa, Egute and Albrecht). On a more global level, Clouting, Douven, Ostrovskaya, Schwartz, and Pataki analyze the institutional capacity for wetland management. Spyra and Albrecht discuss concepts for the future—beside adaptation.

As the climate change conference COP19 in Warsaw lately pointed out, adaptation is becoming more important and the need for specific adaptation strategies has to become more urgent.

The key points of the climate conference in Warsaw deal with the global climate agreement: There is a specific timetable in order to develop the global climate treaty until 2015 in Paris. The conference has also created a solid framework in order to protect forests. Poorer countries should earn money when they protect their jungle and thus contribute to climate protection. Furthermore, the conference implemented the "Warsaw mechanism." Thus, developed countries should help developing countries in climate change related loss and damages.

The industrialized countries had already stated an increase in climate finance in poorer countries up to 100 billion dollars (74 billion euros) annually in 2020. Although poorer countries had asked for it, specific intermediate steps have not been made in Warsaw. A major source of this increase is the Green Climate Fund.

Based on the already existing and financial difficulties, the adaptation fund for developing countries to the consequences of climate change will get as early as 2013, a cash injection of around 100 million dollars (74 million euros) by a few industrialized countries in order to be able to stay operational. This is primarily a signal to developing countries so that they will not lose confidence in the negotiating process.

The editors would like to give their hearty thanks to the 34 authors from ten different countries around the world for their contributions and their cooperation.

Cottbus, Germany

Eike Albrecht
Michael Schmidt
Magdalena Mißler-Behr
Simon Spyra

# Contents

# Chapter 1
# Adaptation to Climate Change in the International Climate Change Regime: Challenges and Responses

**Tanzim Afroz and Mostafa Mahmud Naser**

## 1.1 Introduction

In international law, a regime includes the entirety of rules and practices within one or several interrelated international treaties (Verheyan 2002). The climate change regime, for the purpose of this chapter, has been connoted as the collection of principles, norms, rules, and decision-making procedures in international climate change negotiations (Paavola and Adger 2006, see also Krasner 1982; Young 1994). This regime basically has emerged in the context of the United Nations Framework Convention for Climate Change (UNFCCC) of 1992 which provides a framework in international law for mitigation as well as adaption as climate response strategy. The term 'adaptation', though widely used in climate change agenda, is generally considered as an underdeveloped part of the legal regime of climate change (Linnerooth-Bayer and Meckler 2006). This is because, till date, international climate discourse is mainly focused on mitigation policy to reduce greenhouse gas emissions for addressing climate change impacts. In that respect, the developed countries agreed, under Article 3.1 of the Kyoto Protocol, for emission reductions by at least 5 % from 1990 between 2008 and 2012. However, scientific research already proved that even the most stringent mitigation efforts cannot avoid severe impacts of climate change in the next few decades (Srinivasan 2006). Most alarmingly, several impacts of climate change have already been evident in many ecosystems and economic sectors as reported by the Intergovernmental Panel on Climate Change (IPCC) in its Third Assessment Report (TAR). To cope with these consequences and moderate the impacts of climate change, adaptation as a policy has become prominent in recent climate discourses. These

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concerns drag the focus on legal aspects of adaptation in the international climate change regime.

## 1.2 Legal Response in Adaptation to Climate Change

The UNFCCC is the basic legal document for adaptation to climate change. Beside this Convention, several pertinent provisions of the Kyoto Protocol and the decisions of the Conferences of the Parties (Melkas 2002; Verheyan 2002) govern the basic legal issues of adaptation in international climate regime. However, there is a wider legal framework for adaptation beyond this international climate regime. There are, for instance, other international laws concerned with human rights and protection of nature (e.g. the UN Convention to Combat Desertification and the Convention on Biological Diversity) which provide detailed rules as to when and to what extent adaptation measures might be necessary or mandatory to protect human beings and the environment (Verheyan 2002). International customs as well as national legislations (Paavola and Adger 2006) also have roles to play. But this broader legal framework has not been addressed in this chapter. The following discussion highlights the emergence and challenges of adaptation only in the legal regime of global climate change.

### *1.2.1 Adaptation Under the UNFCCC Realm*

The law on adaptation is still considered in its infancy (Verheyan 2002) as mitigation has been dealt widely in climate change regime so far. As for instance, the main objective of the UNFCCC (from hereafter also: the Convention) is mitigation by stabilizing greenhouse gas concentrations in the atmosphere at a level. If that could be achieved, there was no necessity of adaptation (Verheyan 2002). Realizing the dubiousness, the Convention recognizes the limitation of resources that can be allocated for mitigating the greenhouse gas emissions. Article 2 of the Convention mentions that the mitigation strategy should not compromise food production and sustainable economic growth. That is why in this objective clause a time-frame has been stated for allowing ecosystems 'to adapt naturally to climate change'. Thus adaptation also becomes a part of the UNFCCC framework (Grasso 2010).

However, Article 4 of the Convention is the pivotal section for undertaking adaptation and enhancing adaptive capacity in climate change regime. Paragraph 1(b) of Article 4 provides that parties must formulate and implement national or regional programs containing 'measures to facilitate adequate adaptation to climate change'. Article 3(3) has complemented this clause committing the parties to 'take precautionary measures to anticipate, prevent or minimize the causes of climate change'. Thus the Convention obliges all state-parties to address adaptation in a precautionary and strategic way through programs, not simply relying on

autonomous adaptation by nature (Verheyan 2002). Moreover, in paragraph 1(e) of Article 4, all parties commit to cooperate in preparing for adaptation to climate impacts. This international collaboration has been stressed in several sensitive fields like coastal zone management, water resources and agriculture, protection and rehabilitation of areas affected by droughts, desertification and floods. Beside these initiatives, Article 4, paragraph 1(f) focuses on the careful crafting of adaptation policies in economic, social and environmental sectors of state parties to prevent adverse effects of climate change (Grasso 2010). All state parties also underline a national reporting obligation in that response as per Article 12(1) of the Convention. But these initiatives obviously require 'new and additional financial resources' for developing countries. In this regard, under Article 4(3), the developed state parties and other developed parties included in Annex II (Western Organization for Economic Cooperation and Development—OECD members are considered as Annex II countries under the UNFCCC, Annex I lists all Annex II countries plus countries with economies in transition in Central and Eastern Europe as well as Russia and the Ukraine) commit to provide 'full incremental costs' and transfer of adaptive technologies as required by the developing state parties (non-Annex I party, as mentioned in the Convention). This is because common but differentiated responsibility has been adopted as one of the main principles of the Convention in Article 3(1). More specifically, the developed countries commit to assist particularly vulnerable developing countries in meeting their adaptation costs under Article 4(4). While taking decisions regarding financial assistance and adaptive technology transfer, Article 4(8) and (9) demands special attention to the specific needs of developing countries, small island states, countries with low-lying coasts and prone to natural disaster, arid countries, least developed countries (LDCs) and so on.

Nevertheless, Article 4 of the UNFCCC comprises several ambiguous and problematic issues pertaining to adaptation. For example, paragraph 1(b) of Article 4 does not make clear what constitutes an 'adequate adaptation' (Klein 2002; Grasso 2010) and what is meant by 'facilitate' adaptation. In the absence of any specific definition, donor states only prefer economic efficiency or the cost effectiveness of any adaptive measure to be adequate. But there are other non-economic issues, like the environmental sustainability, technical feasibility, administrative or legal admissibility or acceptability of the measures (Klein 2002; Grasso 2010; Verheyan 2002) which can also determine the adequacy of adaptive measures. Thus the provision legally gives state-parties discretion to judge what is adequate and, ultimately, not to take every possible measure to prevent climate change damages. Rather, by using a non-predefined term such as 'adequate', the Convention leaves a margin of discretion for each party to choose between preventing residual damages or accepting them (Verheyan 2002). Similar criticism can be drawn regarding the term 'facilitate' adaptation. Literally, the word means 'to help, aid or to assist' (Oxford Concise Dictionary 1999) and is often used in conjunction with planning. So it does not cover the full catalogue of measures that could be predicted for making a system climate-safe (Verheyan 2002). Moreover, the role of private sector in enhancing adaptive capacity is the most unexplored but

important issue in the framework. In many vulnerable economies, private companies actually possess the technological, financial or human capacity to increase the adaptive capacity within a community. But Article 4.1(b) of the UNFCCC governs only public adaptation measures because, as an international treaty, the Convention cannot address private entities directly (Verheyan 2002).

There are more ambiguities in Article 4(3) and 4(4) of the Convention regarding the interpretation and application of terms like 'incremental costs' and 'resources. . .needed' (Werksman 1993; Bodansky 1993). The incremental cost concept is linked to the fact that the UNFCCC only applies to human-induced climate change and not on current (natural) climate change and variability (Grasso 2010). Therefore, the Convention only finances for incremental costs of impacts produced by anthropogenic climate change, whereas the general costs (and benefits) of adapting to normal climate is left aside. Moreover, the institutional infrastructure for channelling assistance to developing countries, as mentioned in the Convention, is very general in term. It does not oblige any party to carry out any particular kind or type of adaptive measure. Neither does it specify any time-frame in which the duty arises. As a consequence, the climate change regime, so far, has failed to fully materialize the assistances ensured by the Convention (Paavola and Adger 2006).

### *1.2.2 Adaptation Under the Kyoto Protocol and COPs Decisions*

Some directives of the UNFCCC have been further specified and dealt with in detail in the Kyoto Protocol and in several decisions of the Conferences of the Parties (from hereafter, COPs) to the Convention. As for instance, Article 3(14) of the Kyoto Protocol commits the Annex 1 countries (developed states as enlisted in Annex I of the UNFCCC) to meet their emission reduction targets for minimizing 'adverse social, environmental and economic impacts on developing countries'. Article 10, paragraph 1(b) of the Protocol directs the non-Annex I parties to formulate, publish and regularly update national programs for adaptation to climate change (Paavola and Adger 2002, 2006). In this regard, National Adaptation Programs of Action (NAPAs) is a process to be used for generating these plans. Marrakech Accords (COP7 2001) specified the guidelines for the preparation of NAPAs to unify the national priorities for adaptation. These guidelines require multi-disciplinary and public consultation in the preparation of NAPAs (Decision 29/CP7). In Least Developed Countries (LDCs—a group of 50 countries with roughly 11 % of the world's population), NAPAs are prepared with the institutional support of the LDC Expert Group (LEG) and financed by a dedicated fund, the LDCF (Grasso 2010). These NAPAs are a partial implementation of Article 4.1 (b) of the UNFCCC and so far, these are the only documents within the Convention which deal solely with adaptation (Verheyan 2002).

In climate change regime, adaptation gained further attention in 2004 at COP10 in Argentina. The Buenos Aires Programs of Work on Adaptation and Response Measures was adopted during this Conference (Decision 1/CP10). This program included further scientific assessments of vulnerabilities and options for adaptation, support of the NAPAs of LCDs, new workshops and technical papers on climate change risk and adaptation, and support for mainstreaming adaptation into sustainable development planning (Srinivasan 2006). These objectives and scopes of the Buenos Aires Programs of Work were further specified by a detailed 5-year program of work at COP11 in Montreal in 2005. This 5-year program of work mainly focused on impacts, vulnerabilities and adaptation to climate change with an aim that these will assist state parties, in true sense, to make informed decisions on implementation of adaptation measures (Decision 2/CP11). The Bali Roadmap (COP13 2007) fostered alliances between the North and the South to promote adaptation in the developing world (Grasso 2010). Finally, the Copenhagen Accord (COP15 2009) concentrates on the urgent necessity of enhanced action and international cooperation for adaptation initiatives. Most significantly, the importance of adaptation for implementing the objectives of the Convention has been admitted during this Conference (Decision 3/CP15) and the Copenhagen Adaptation Framework has been established.

### *1.2.3 Evolving Focus on Adaptation Outside the UNFCCC Realm*

Despite the COPs, there are other significant ongoing activities in the field of adaptation within as well as outside the realm of the UNFCCC. The Adaptation Policy Framework (APF) is such a program initiated by the United Nations Development Program (UNDP). The principal aim of this Framework is to incorporate adaptation into countries' national development strategies. In this regard, international donor organizations are also sharing supportive views as several reports in recent years have made them concerned that climate change is going to influence their activities in poorer countries. In 2003 the Vulnerability and Adaptation Research Group (VARG) published a report titled 'Poverty and Climate Change' (AfDB 2003). This report highlighted the importance of integrating climate change into development programming. Another report was published in the same year by the Asian Development Bank. It also focused on how to mainstream adaptation in Asian Development Bank (ADB) project operations (ADB 2003). Thus the donor agencies are supporting adaptation strategies remaining outside the Convention's realm.

Besides, several environmental and conservation institutions around the world are also turning their attention to adaptation to climate change vigorously. The Convention on Biological Diversity (CBD), for example, is working on the identification of opportunities to adapt to climate impacts in a way that protects

**Table 1.1** Examples of different types of adaptation

| Sector | Reactive | Anticipatory |
|---|---|---|
| Private | • Moving home | • Changing architecture of building |
| | • Changing insurance premiums | • Buying hazard insurance |
| | • Buying air-conditioning systems | • Devising new customer products |
| Public | • Offering compensation or subsidies | • Installing early warning systems |
| | • Enforcing building codes | • Establishing new building codes |
| | • Beach nourishment | • Constructing dykes |

Source: UNFCCC (2006)

biodiversity (Grasso 2010). The Worldwide Fund for Nature (WWF) and the World Conservation Union (IUCN) are dealing with effective eco-system management to amplify the adaptive capacity of vulnerable communities. Even many humanitarian organizations, like the Red Cross or Red Crescent, which mainly use their expertise in disaster management, are practicing to adapt to climate impacts. A number of national initiatives, such as the United Kingdom's Climate Impact Program or Canada's Climate Change Impacts and Adaptation Program, are especially dealing with adaptation to climate change (Grasso 2010). Thus adaptation, though in a creeping manner, finally got attention in the climate change regime.

But the problem is that there is no uniform definition of adaptation, and various stakeholders define and interpret it quite differently. The IPCC, for example, considers a wide range of various adaptations according to intention, time of action and type of actors involved, such as autonomous vs. planned adaptation, anticipatory vs. reactive adaptation, and public vs. private adaptation (Srinivasan 2006); a few examples are incorporated in Table 1.1 But the UNFCCC interprets adaptation within a very limited scope and emphasizes only on human-induced long-term climate change. This difference may seem small but it is sufficient enough to lead widespread confusions regarding funding in international negotiations. This financial implication of adaptation is another area of concern which we will consider next.

## 1.3 Adaptation Funding: Status and Challenges

The climate change regime is significant in both legal and political terms, as it provides developing countries with a legal basis to claim funds from developed countries for the purpose defined in the UNFCCC (Verheyan 2002). But regarding adaptation finance, there is no legally binding quantitative obligation (Bouwer and Aerts 2006). All such funds as described in Table 1.2 comprise voluntary contributions from developed countries.

### *1.3.1 Adaptation Funding Under the UNFCCC*

The UNFCCC contains two categories of financial obligations in Article 4(3) and 4(4) respectively. The first one is generally aimed at helping developing countries

**Table 1.2** Adaptation funds under UNFCCC and Kyoto protocol

| Fund | Created under | Funding source | Beneficiaries | Benefits | Legal basis for funding |
|---|---|---|---|---|---|
| GEF Trust Fund | UNFCCC | GEF | Developing countries | Incremental cost | UNFCCC Art. 4.3, 1/CP11, 5/CP7, GEF/C23/Inf8 |
| Strategic Priority on Adaptation (SPA) | UNFCCC | GEF | Developing countries | Incremental cost | 6/CP7, GEF/C23/Inf8 |
| Special Climate Change Fund (SCCF) | UNFCCC | Developed country discretionary pledge | Developing countries | Additional costs of adaptive measures<br>Uses sliding scale | 5/CP7, 7/CP7, 5/CP9, GEF/C24/12, GEF/C25/4/Rev1 |
| Least Developed Countries (LDC) Fund | UNFCCC | Developed country discretionary pledge | Least developed countries | Additional costs of adaptive measures<br>Uses sliding scale | 5/CP7, 7/CP7, 27/CP7, 28/CP7, 29/CP7, 6/CP9, 3/CP11, 4/CP11, GEF/C24/Inf7, GEF/C24/Inf8/Rev1, GEF/C25/4/Rev1 |
| Adaptation Fund | Kyoto Protocol | 2 % Share of proceeds from CDM | Particularly vulnerable developing countries | To be determined | 5/CP7, 10/CP7, 17/CP7, 28/CMP1 |

Source: Mace (2005)

**Table 1.3** Staged process under GEF

| Stage | Stage I: planning (short term) | Stage II: preparation (medium term) | Stage III: initiation (long term) |
|---|---|---|---|
| Parties involved | All | Particularly vulnerable countries or regions | Particularly vulnerable countries or regions |
| Activities | • Studies of possible impacts of climate change<br>• Appropriate capacity-building<br>• Identification of particularly vulnerable countries or regions | Measures to prepare for adaptation, including further capacity-building and development of appropriate adaptation plans | Measures to facilitate adaptation, including insurance and other adaptation measures |

Source: Bouwer and Aerts (2006)

to implement their duties under the Convention whereas the second one obliges adaptation costs for particularly vulnerable developing countries. Pursuant to Article 21(3) and various COP decisions, Convention funding is provided through the Global Environment Facility (GEF) Trust Fund. The GEF has been supporting developing countries on adaptation to climate change through a staged process as shown in Table 1.3 Stage I was to support studies and planning, Stage II to support detailed planning and capacity building as envisaged in Article 4.1(e) and Stage III to support actual adaptation, *inter alia*, insurance measures and other measures to implement Article 4.1(b) and 4(4). Most developing countries have already carried out the initial assessment (or Stage I) studies on adaptation. A few Stage II studies, for example in the Caribbean, Pacific and Bangladesh, have also been initiated (Adger et al. 2003). But the Stage III activities have been troubled as the guidance given at COP6*bis* is not clear enough. There are other hardships for adaptation costs under this fund because of its operational strategy. It stipulates that the projects financed or co-financed by the GEF shall result in 'global benefits' whereas adaptation often benefits only the region or country in which measures are undertaken (Bouwer and Aerts 2006; Verheyan 2002). Moreover, the Convention does not define the term 'particularly vulnerable' which keeps open the problem of interpretation. Thus the GEF does not have any clear guidance on which countries are eligible recipients for funding (Verheyan 2002).

In July 2004, the Strategic Priority on Adaptation (SPA) of the GEF Trust Fund was launched to support pilot projects that could demonstrate how climate change adaptation and planning could be integrated into country policy and sustainable development planning (Francisco 2008). However, SPA never graduated beyond its 'pilot' phase. It is available to developing countries on application, subject to a complex assessment of their capacity. Because of this tough application procedure, the expenditure under SPA has been and remains excruciatingly slow. An original allocation of US$ 50 million to the SPA had not been spent by the end of the initial pilot period and no further fund was added for the next 'replenishment' period that

is from 2007 to 2010 (FCCC/CP/2007/3 para 8). Moreover, many developing countries are not aware of what is on offer or how to access these funds. According to GEF's latest report, for example, only one of 10 GEF-supported climate change projects in financial year 2006–2007 concerned adaptation through the SPA, amounting to just US$1 million of a total US$81 million spent on climate change projects (FCCC/CP/2007/3 paras 16–17). The rest was geared towards mitigation while developing countries do not have mitigation obligations.

Beside this SPA fund, there are two special funds under the Convention to support adaptive efforts. These are the Special Climate Change Fund (SCCF) and the Least Development Countries (LDC) Fund. Both of these funds were created by the Bonn Agreement in 2001 at second session of COP6 (Decision 5/CP6) and confirmed at COP7. They are based on the funding made available by the Annex I countries and managed by the GEF (Paavola and Adger 2006). The SCCF was created to support adaptation activities and capacity building but, until recently, this fund remained inactive. However, seven SCCF projects were finally approved in 2006–2007, which involved only eight countries whereas there are 121 developing country parties to the UNFCCC. The LDC Fund was entrusted to support the work program of the LDCs under the Convention, including the preparation of NAPAs (Decision 5/CP7). In this project it has provided little more than US$10 million so far (Bouwer and Aerts 2006) and 32 NAPAs have been finished to date. On the basis of these NAPAs existing at the time, the Stern Review (2006) projected that US$1.3 billion would be required for the immediate adaptation needs of the 47 Least Developed countries (LDCs). So far, nothing close to this amount is forthcoming.

### *1.3.2 Adaptation Funding Under the Kyoto Protocol*

Article 12(8) of the Kyoto Protocol provides that a share of the proceeds of Clean Development Mechanism (CDM) projects should be used to assist particularly vulnerable developing countries to meet the costs of adaptation. In that response, COP6 created an Adaptation Fund to replenish from a 2 % levy on CDM projects (Table 1.2). Procedures for its management were eventually approved in Bali Roadmap at COP13 in 2007. One positive outcome is that this fund involves a Board with strong developing country representation. However, the World Bank estimates this fund is likely to remain small and uncertain, with funds anywhere between US$ 270 and 600 million by 2012 (World Bank 2006).

### *1.3.3 Future Potential Funding of Adaptation*

The costs of adapting to an approximately 2 °C warmer world by 2050 were estimated and the range lies between US$ 75 and 100 billion per year from 2010 to 2050 (World Bank 2009). However, the total available annual funding for

adaptation under the Convention or the Protocol up to 2012 ranges from US$ 20 million to US$ 300 million at best (Srinivasan 2006). From this viewpoint, it is unrealistic to cover all the costs related to adaptation. So the Copenhagen Accord (COP15 2009) focuses on a wide variety of funding sources, public and private, bilateral and multilateral, including alternative sources of finance (Decision 8/CP15). Foreign Direct Investment (FDI), Official Development Assistance (ODA), insurance and disaster pooling, public expenditure including public–private partnerships (PPPs), non-compliance fund, disaster relief and risk reduction can be such alternative sources. The Copenhagen Accord also established a new Copenhagen Green Climate Fund. However, it remains to be seen how this instrument relates to the already existing adaptation funding mechanisms under the Convention and the Protocol (Schalatek et al. 2010).

## 1.4 Conclusion

Adaptation to current and future climate change regime is a cross-cutting issue (Verheyan 2002). Defining a new approach to address adaptation in the post-2012 regime is a challenge but its necessity has been recognized by the international community in the meantime. Such a new approach may evolve into the establishment of a separate protocol for adaptation in the long run (Srinivasan 2006). A suitable mechanism for effectively monitoring the transfer of new and additional funding from developed to developing countries is also necessary. Options for establishing a mandatory global funding scheme, which is tied to both past and current greenhouse gas emissions by various countries, should be explored as a high priority. If that can be achieved, all countries, both developing and developed, can contribute to and benefit from such a scheme based on the principle of common but differentiated responsibility (Srinivasan 2006).

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# Chapter 2
# Advancing Forest-Related Adaptation: Options for Adaptation-Oriented REDD+

**Andrew Long**

## 2.1 Introduction

The single most promising legal and political opportunity for simultaneously preserving tropical forests and combating climate change in the near future is the developing REDD+ mechanism (for summaries of REDD+ proposals see Parker et al. 2009). REDD+ has been understood primarily, if not exclusively, as a mitigation mechanism by most commentators because it has the potential to significantly reduce the nearly 20 % of global greenhouse gas emissions attributable to the forest and land use sector. However, as REDD+ becomes established, it will inevitably have a significant impact on adaptation in tropical forest regions. This impact will not necessarily be beneficial, but design choices made now—in the early stages of REDD+ development—can shape the mechanism to become a profoundly valuable instrument for advancing adaptation in tropical forest countries (for in-depth discussion see Long 2011; for a discussion focusing on biodiversity benefits see Long 2009). This chapter discusses the options for designing REDD+ to maximize adaptation benefit while retaining its mitigation value.

## 2.2 Climate Change and Forests

### *2.2.1 Adaptation in the Forest Context*

The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as "[i]nitiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects" (IPCC 2007 p. 76). In the context

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of tropical forests, adaptation requires adjustments to management, institutions, and other factors influencing the impacts that climate change will have on the forests (Glück et al. 2009 p. 187). As suggested by the IPCC definition, adaptation can be measured and discussed in essentially two ways: adaptation of natural systems and adaptation of human communities. These two types of adaptation will frequently overlap—activities beneficial to the maintenance of natural systems will often support the well-being of the human communities who interact with those systems. However, the two types of adaptation may also appear in conflict, at least in the short term. For example, human communities may seek forest clearing to expand agricultural operations as a means of counteracting reduced agricultural productivity caused by climate change. Thus, a major consideration of policy makers should be ensuring that supported adaptation activities provide benefits for sustaining both human and natural systems through climate change.

Adaptation of natural systems can be assessed in various ways, but two factors appear most significant. First, natural systems adaptation is frequently closely related to preservation of the species comprising the ecosystem in question (Secretariat of the Convention on Biological Diversity 2010 p. 58). Thus, natural systems adaptation will frequently involve a focus on preservation of biodiversity. Second, natural systems adaptation can be assessed according to its impact on the ecosystem services of a particular region. As ecosystem services are frequently underlain by biodiversity, these two measures will often yield similar assessments of the wisdom of particular activities aimed at promoting adaptation of natural systems in tropical forests. In nearly all cases, activities designed for natural systems adaptation will align with practices supported by the concept of sustainable forest management (SFM) (Adaptation of Forests and People to Climate change, Executive Summary and Key Messages, at 12; Broadhead et al. 2009 pp. 60–61).

Adaptation of human communities can be assessed according to a variety of measures, but perhaps the most comprehensive is human well-being. Well-being includes consideration of not only economic status, but also health and quality of life (for a general discussion of well-being analysis see Bronsteen et al. 2010; for an application to international climate change law see Vandenbergh et al. 2009 pp. 336–337). In tropical forest areas, as elsewhere, human well-being is at least partially linked to the maintenance of the services provided by the forest ecosystem (Secretariat of the Convention on Biological Diversity 2010 p. 9). Therefore, activities aimed at human adaptation may in fact be aimed at preserving ecosystem services, such as hydrological regulation, through climate change. Nonetheless, human community adaptation also contains institutional considerations that underlie effective natural systems adaptation, especially improving governance to support effective forest management and creating sustainable livelihoods to alleviate poverty as a means of reducing the human toll of climate change effects.