Universität Bremen

Institut für Politikwissenschaft

Bachelor-Arbeit

Regime effectiveness of climate protection – adapting Elinor Ostrom's institutional design principles

Gutachter:

Prof. Dr. Rainer Baumann
Dr. Klaus Dingwerth

Autor:

Nils Droste
Tarmstedter Str. 24
27404 Badenstedt

Nils.Droste@t-online.de

Matrikel-Nummer: 2423048

3. Fachsemester Politikwissenschaft B.A. (HF)
2. Fachsemester Wirtschaftswissenschaft (NF)

Table of Contents

1 Introduction

"For two decades, governments have struggled to craft a strong, integrated and comprehensive regulatory system for managing climate change"

(Keohane/Victor 2010: 2).

The climate is very likely warming due to the additional anthropogenic emission of greenhouse gases (cf. IPCC 2007)[1]. Consequences – such as a loss of biodiversity, deforestation, desertification and extreme weather events – are likely to increase. Hence, humanity is challenged to reduce the total amount of emitted greenhouse gases (GHG).

The Framework Convention on Climate Change (UNFCCC) is a United Nations' agreement upon preventing "dangerous anthropogenic interference with the climate system" (United Nations 1992: Article 2). The current treaty, the Kyoto Protocol (KP), is ending in 2012. The KP reduction goals are low – the overall reductions of Annex I states are 5% below 1990 level (cf. United Nations 1998). This is likely not sufficient to keep global warming within the limit of two degrees Celsius average temperature rise, a limit which is widely agreed upon[2]. In the Bali Action Plan the conference of the parties decided to set up a Post-Kyoto Protocol at its fifteenth session in Copenhagen (cf. United Nations 2007: § 1). But the treaty did not become reality. To date, the international political measures to protect the climate by reducing emissions are probably not preventing a "dangerous" climate change if the danger limit is set at two degrees average temperature rise. So how can the climate effectively be protected?

There is a promising model of successful governance of common pool resources at a lesser level. Elinor Ostrom's institutional design principles have been derived from the study of institutions that govern local and regional common pool resources (cf. Ostrom 1990). But the climate[3] is a global resource. It has not yet been proofed that successful, sustainable resource management on a global scale can conform to Ostrom's principles. Until the climate is effectively protected a proof cannot be derived from the analysis of its governance. This work is based on the assumption that Ostrom's principles can provide valuable insights toward effective climate protection.

1 Intergovernmental Panel on Climate Change (IPCC)

2 More than 120 states undersigned the Copenhagen Accord which sets the 2°C average temperature rise limit. See http://unfccc.int/home/items/5262.php (accessed on 24.05.2010)

3 The IPCC defines the climate system as "the highly complex system consisting of five major components: the atmosphere, the hydrosphere, the cryosphere, the land surface and the biosphere, and the interactions between them" (IPCC 2007: 79).

In the remainder I will proceed as follows. In section two I set the theoretical framework and shortly present Elinor Ostrom's understanding of her principles in general. I discuss how a) the climate can be understood as a common pool resource; b) Ostrom's broad conception of rationality fits both individual actors' and states' behavior; and c) effective the regime for climate protection is. In section three I analyze the regime for climate protection principle by principle. The structure for each of them is: introduce, explain its function, adapt where necessary, examine implementation and formulate a thesis regarding the effectiveness of the climate protection regime.

I show that the regime for climate protection shares most of the design principles and hence is likely to succeed. The principles largely lacking implementation are a) congruence between appropriation, provision and regional conditions and b) graduated sanctions. Because climate protection is not yet effective I examine possible solutions by including two further design principles. Because the conflict resolution mechanisms on the global scale do not solve the basic conflict of the actual distribution of shared burdens, I argue that either 'leadership' or increasingly 'shared norms' can facilitate an effective follow-up treaty.

2 Theoretical framework

Elinor Ostrom's analysis was based on case studies of small to medium scale common pool resources (CPR) from Switzerland, Japan, Spain and the Philippines, Turkey, Sri Lanka, Canada and others. These cases were selected to give "clear information about processes involved in (1) governing long-enduring CPRs, (2) transforming existing institutional arrangements, and (3) failing to overcome continued CPR problems" (Ostrom 1990: 26, 27). Developing further a framework Ronald Oakerson had prepared (cf. Oakerson 1990), Ostrom condensed eight central institutional design principles for a successful governance of CPRs[4]. For Ostrom a design principle is

> *"an essential element or condition that helps to account for the success of these institutions in sustaining the CPR and gaining the compliance of generations after generations of appropriators to the rules in use"* (Ostrom 1990: 90).

These are meant as design principles rather than a blue print (cf. Ostrom 2008). The principles all together do not necessarily result in a specific type of institution. There is

4 Ostrom' institutional design principles are: clearly defined boundaries, monitoring, congruence between appropriation and provision rules and local conditions, collective-choice arrangements, nested enterprises, minimal recognition of rights to organize, conflict resolution mechanisms and graduated sanctions – a detailed description follows in section 3.

a variety of institutions such as hierarchies, markets, and community self-governances that may lead to successful sustainable resource management (cf. Dietz et al. 2003: 8).

> *"Robust, long-term institutions are characterized by most of the design principles. [...] Fragile institutions tend to be characterized by only some of these design principles. Failed institutions are characterized by very few of these principles"* (Ostrom 2002: 10).

Hence, I assume that – also on the global scale – a CPR regime is the more likely to be successful the more design principles are implemented. Before these design principles can be adapted to the global level, I see some difficulties. First, her principles are regarding common pool resources. Is the global climate a CPR? Second, the actors involved in the original set are individuals or households. Do states and other collective actors involved in climate protection behave similarly? Third, what is the logic of collective action? How can free riding be solved? I discuss each in turn.

2.1 The climate system as a CPR-problem?

Why can climate protection be treated as a CPR-problem? A CPR is characterized by a) subtractability or rivalness and b) a difficulty of excluding potential beneficiaries (cf. Dolšak/Ostrom 2003: 7). Regarding the global climate Jouni Paavola (2008) argued two points: a) rivalry is not regarding the direct benefits from the global climate but the pollution of the atmospheric (and other) sinks. Because there is a total limit of pollution[5] the climate system can absorb without collapsing, every pollution unit emitted is no more available to other users; b) the difficulty of excluding potential beneficiaries is that wherever a GHG unit is emitted it affects the global climate. The climate system has no national borders but protection is provided by national governments because they have the "mandatory power to establish and enforce regulations" (cf. Paavola 2008: 327). Due to the anarchic structure of the international system it is difficult to exclude certain states from emitting GHG. So the climate can be understood as a common pool resource, a rival sink with a difficulty of excluding potential users.

2.2 Individuals and states as rational actors?

How similarly do collective actors such as states and other actors involved in climate protection behave to individuals and households? In her work on "governing the commons" Elinor Ostrom used a broad conception of rational actors. "Four internal

5 Although widely discussed but still an exemplary limit is 450ppm (cf. Graßl et al. 2003)

variables – expected benefits, expected costs, internal norms, and discount rates – affect an individual's choice of strategies" (Ostrom 1990: 37).

Although collective actors and thereby more pluralistic than an individual, states are largely seen as rational actors. Even if the main goals which states pursue differ in the mainstream international relations theories, many converge in assuming that states behave rationally. Neo-realist John Mearsheimer assumes that states act rationally in gaining relative power (cf. Mearsheimer 2001). Liberalist Andrew Moravcsik assumes pluralistic societal actors that "on average" behave rationally (Moravcsik 1997: 516). Institutionalist Robert Keohane argues from a rational-choice point of view (cf. Keohane 1983). Although these theorists reach quite different conclusions, their understanding of states as rational actors fits Ostrom's assumption about actors' strategic choices.

Similar to these understandings, I assume that states behave rationally in their choices of strategies according to the expected utility. In other words, they evaluate means and ends and choose the option which promises the best relation of costs and benefits (cf. Tsebelis 1990). Moreover I assume some knowledge about the probability that a certain outcome will become reality. Taking into account the risk that it will not happen, states decide according to the utility they *expect* to gain. The probability a rational actor will assume depends on her knowledge of past events. The further in the future any expected outcome will pay off, the more insecure her knowledge about this probability becomes. That is why a discount rate diminishes the expected future outcome.

The broad understanding of rationality that Ostrom applied allows the inclusion of norms that shape interests according to the constructivist perspective (cf. Wendt 1992). I assume that whether economic growth or climate protection[6] is rated higher is not exclusively a question of rationality but also a normative one. Taking into account that future outcomes are risky, the value an actor assigns to a certain outcome also depends on the norms she has. Although economic growth might be more likely to happen than climate protection, some actors (e.g. green parties) consider it more important. Furthermore, the expected utility depends on knowledge. Sir Nicholas Stern (2007) has shown that - accepting the discount rate he set – a climate protection is cheaper to be done by now than in future. Without this knowledge a rational actor who values economic growth higher than climate protection would never expect a higher utility

6 Due to the current production structure which is mainly based on fossil energy use and by growth emits more GHG this seems an adequate example.

from the latter. The utility a rational actor assigns to a certain outcome depends on this knowledge and norm-based rating. But the choice of a mean for this cognitively, normatively set end is then a question of rationality.

A government consists of several rational actors and the accumulated will of the government consists of their power and position. Beyond this, I assume that the order of preferences of collective actors differs according to the political system. The respective decision-making procedures define the collective choice. Any sort of monocracy can define its preferences mainly top-down. In democracies the structure of preferences also depends on the bottom-up accumulated will of the majority.

The concept of a rationally behaving state that sets its preferences according to norms and knowledge is certainly a real complexity reducing theoretical construct. It is an instrument that helps to derive some insights from Ostrom's work into the global climate CPR. Hence, I assume that states choose their strategies according to expected benefits, expected costs, internal norms, and discount rates – just as Ostrom assumed for households.

2.3 Logic of collective action

Generally, in collective actions such as the protection of the global climate, the risk of free riding is a central problem. Free riding means gaining the benefits of a provision of common goods without contributing to the costs of it (cf. Dolšak/Ostrom 2003: 8). Individual rational maximization of utility can lead to an overuse of the resource, an outcome that is collectively suboptimal and thereby non-rational. To avoid free riding and facilitate a collective provision of a good there must be an effective solution. Garrett Hardin named such a solution “mutually agreed upon coercion” (Hardin 1968: 1247). Mancur Olson (1968) presented selective incentives as a solution for the provision of a collective good. Ostrom's design principles are a detailed set of characteristics that effectively sustained common pool resource share – conditions to avoid free riding and create a socially optimal, collectively rational outcome[7].

2.4 The effectiveness of climate protection

Before discussing Ostrom's principles in detail it is worthwhile to have a look at how effective the regime for climate protection already is. First, what is the regime for climate protection? I do not dive into the discussion of the meaning of regime. I refer to

7 I want to stress here that in contrast to Hardin's analysis Ostrom sees cooperation much more likely to happen in CPR problems and provides empirical data (cf. Ostrom 1990).

an international regime of climate protection as a set of "principles, norms, rules, and decision-making procedures around which actor expectations converge in a given issue-area" (Krasner 1982a: 185). Robert Keohane and David Victor (2010) observe not a single regime but a regime complex for climate protection. They see many sub-regimes that do not cover the whole range of climate protection such as UN Legal Regimes (e.g. UNFCC), UN Agencies (e.g. UNDP, UNEP), Expert Assessments (e.g. IPPC reports), the Montreal Protocol, multilateral development banks (e.g. World Bank), clubs (e.g. G20) and other uni- and bilateral agreements. According to their analysis the UNFCCC could work as an "umbrella" and as the source for an "integrated and comprehensive policy regime" (ibid.: 25). Yet climate protection is not that comprehensive regime but a regime complex consisting of the above mentioned parts and organizations. In my analysis I focus on the UNFCC because it could function as a comprehensive umbrella.

Second, what does effectiveness mean? Some understand effectiveness as a shift in behavior in "a way as to eliminate or substantially ameliorate the problem that led to its creation" (cf. Young/Levy 1999: 1). Some refer to regime effectiveness as "the capacity of the regime to solve the environmental problems it is meant to solve" (cf. Hisschemoller/Gupta 1999). Similar to these understandings, I refer to effectiveness of the regime complex for climate protection as the capacity to avoid a "dangerous anthropogenic interference with the climate system" (United Nations 1992: Article 2) through pollution by CO_2 or equivalents.

Third, there are some empirical differences along the different sub-regimes of the regime complex for climate protection. Since it came into force in 1989 the Montreal Protocol effectively managed to stabilize the amount of chlorofluorocarbons (CFC) in the atmosphere (cf. World Meteorological Organization 2007). The other GHG are met by the UNFCCC under which the Kyoto Protocol (KP) is a legally binding treaty for reducing the emissions of GHG. But the KP did not have an overall reduction effect. The total amount of GHG in the atmosphere constantly rises (cf. IPCC 2007). The states that assigned a reduction of GHG (KP Annex B) have on average stabilized their emissions but still are not on track to meet their reduction goals. The states that have not undersigned any reduction goals (KP Non-Annex B) have on average augmented their emissions (cf. Le Quéré et al. 2009). This results in an overall rise in GHG emissions.

To avoid the difficult discourse about which limit of GHG emissions is adequate, I measure the effectiveness of the regime of climate protection by the average temperature rise limit of two degrees Celsius. This limit is currently undersigned by

more than 120 states in the Copenhagen Accord[8]. Although the accord is neither legally binding nor formally part of the UNFCCC, it is the political will of the majority of UNFCCC states. I take this as a politically widely agreed upon limit with which to measure the effectiveness of avoiding a 'dangerous' climatic change. Recent research has shown that the voluntary reduction goals assigned in the Copenhagen Accord would lead to an average temperature rise of 3.5° Celsius (cf. Wicke/Schellnhuber/Klingenfeld 2010). Therefore, the UNFCCC is not effective according to the temperature goal.

In the following analysis I focus on the UNFCCC as a part of the regime complex for climate change that is not effective, searching for the reasons by adapting Ostrom's principles to the global level. On the way I will have a short look at the differences that made the Montreal Protocol more effective.

3 The institutional design principles in climate protection

Following I present the original institutional design principles that Ostrom (1990) has pointed out in her work "Governing the Commons". I discuss every principle by a) citing Ostrom's understanding, b) illustrating its meaning, and c) explaining its function for the climate protection as a CPR governance. Where necessary I adapt the principles to the characteristics of the climate and international political system (d). In a fifth step I examine to which degree the principle is already implemented in the UNFCCC (e). Following I formulate a thesis regarding the effectiveness of the Convention (f).

3.1 Clearly defined boundaries

> *"Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined as must the boundaries of the CPR itself"*
>
> (Ostrom 1990: 91).

Illustration: When looking at any CPR management it is a crucial step to define what is used, how, and by whom. Without a defined area of use and users no institution can be created to facilitate cooperation. It might be necessary to exclude potential beneficiaries or an exploitive use.

Imagine a lake with two tribes of fishermen. Both are dependent on the food the fish provide. One tribe lives in a village close to the lake and fishes during the day. I call them the day clan. The other is living deeper in the woods and comes out to fish by night – the night clan. Due to their culture the two tribes have never met. As they each

8 See http://unfccc.int/home/items/5262.php (accessed on 24.05.2010)

fish, the natural recreation rate of the fish is surpassed. Both tribes catch less and less fish, but they do not know why. It is clear that both tribes will fail in sustaining the fish population if they never understand that they are not the only fishermen. The users must be clearly defined. The entire group who uses the resource must be identified. One option might be to exclude one clan.

Now, imagine that the CPR is not a lake but the mouth of a river. There is just one tribe fishing. They specialize in catching salmon. Over time the salmon diminish. An imaginable reason might be that the tribe prefers large salmon, the ones who spawn upriver. Without any offspring the salmon die out. Once again successful CPR management requires a clear definition. In this case it must be defined how many salmon can be caught without major harm to the entire population. This would be one of the physical boundaries of the CPR itself that defines a sustainable use. There also can be temporal or spatial boundaries. This tribe might catch other types of fish when the salmon come to spawn. Or they could fish within only one half of the river to let enough of the salmon escape. These imagined examples may provide some understanding of a clear definition of CPR and its users. And it leads me to the function that this principle is to take for successful CPR management.

Function: The physical constraints of a natural resource such as the rate of renewability determine the amount of use that does not deteriorate the resource over time. Or, in economic terms, there is a maximum sustainable yield that defines the point after which the aggregate level of revenue diminishes (cf. Dietz et al. 2003). These natural constraints must be defined clearly to make a sustainable use feasible at all. If the limit is unknown it can be exceeded too easily. The definition itself requires a deep understanding of the nature of the resource. Defining and understanding the limits of the resource function as prerequisites for not overusing the resource. The same is true of the user group that withdraws resource units. Open access easily leads to overuse. Everyone can withdraw as much as he wants until the rate of renewability is exceeded. Some might even invest in sustaining the resource while others grab the benefits, the classic free riding problem. Hence, identifying the entire user group is a prerequisite for arranging some sort of social agreement, rule or institution that ensures that the natural limits of the resource are not surpassed. One possible solution might be an exclusion mechanism (cf. Ostrom 1990; Oakerson 1990; Keohane/Victor 2010). Excluding potential beneficiaries can eliminate open access and the overuse that results from the absence of any restriction. This form of institution definitely requires power. By setting

clear limits of both use and user group that meet the specific needs to sustain the resource, a basic task is accomplished. What does this mean for the global climate as a CPR?

Adaptation: This principle is supported by recent regime analysis (cf. Keohane/Victor 2010) if clearly defined boundaries go along with epistemic quality. In the case of the climate system its characteristics, functioning and dependence on subsystems are to be understood properly. The maximum level of pollution that can be mitigated is to be especially defined. The matters that affect the climate's functioning and cause the overall warming are to be identified. Defining the resource makes it more difficult to manage and sustain due to its complexity (cf. Dietz et al. 2003).

The sources, quantity and quality of emissions are also to be analyzed carefully. The human and natural pollutants of the climate have to be identified (cf. Paavola 2008). Regarding human activity, the ones who use the climate system as a sink must be clearly defined. It is difficult to feasibly exclude certain users. A pollution unit can be emitted anywhere and affect the climate system. Until all in authority agree, an institution might not comprehensively avoid free riding. Users and sources of pollutants can be excluded e.g. by markets or other regulative mechanisms. How much progress has the UNFCCC made in defining the limits of the climate and its users?

Implementation: As approached above, a) the boundaries of the climate system, especially the maximum level of pollution that can be recovered, and b) the sources of emittance, whether human or natural, are to be defined clearly. Exclusion mechanisms, either for pollutants or users, might be a solution (c).

Ad a) The climate monitoring IPCC understands the climate system as "the highly complex system consisting of five major components: the atmosphere, the hydrosphere, the cryosphere, the land surface and the biosphere, and the interactions between them" (IPCC 2007: 79). The limits that the climate system can absorb are already surpassed; otherwise no temperature rise would have occurred. Very likely the reason for the rise in average temperature is the additional anthropogenic emissions of GHG. In any of the presented scenarios the GHG emission will still increase. In the most optimistic ones 20- 30% of species are "so far likely to be at increased risk of extinction if increases in global average warming exceed 1.5 to 2.5°C (relative to 1980-1999)" (IPCC 2007: 54). These are just a few of the insights the IPCC provides. The data the IPCC processes in its reports are collected worldwide from climate researchers. There is an increasing quantity and quality of epistemic knowledge about the systemic capacity of the climate

to absorb GHG and the consequences of a global warming. Although even the IPCC publishes its reports under some uncertainty (ibid.: 27), this part of the principle is broadly implemented.

Ad b) Much knowledge is also available about the sources of human activity that emit GHG[9]. The major cause (57%) of anthropogenic GHG emissions is the use of fossil fuels (cf. IPCC 2007: 36), which has almost doubled since the 1970s. The second largest contribution is land use. Its distribution along regions differs significantly[10]. Both beneficiaries and sources can be identified clearly.

Ad c) Through an exclusion mechanism a CPR could become sort of a private or club good, more easily protected because of interest in maintenance. In contrast a CPR requires collective action for protection, a condition that makes coordination and cooperation more complex in the absence of a single authority or a collectively created single authoritative institution. As long as the supply, production and consumption structure depends on the use of fossil fuels it is both normatively and feasibly difficult to exclude someone from emitting GHG. Feasibly such an exclusion seems difficult because it would need a capable authority on a global scale, of which there is none. The member states of the UNFCCC or Kyoto Protocol have an exit option. A state can withdraw its membership (United Nations 1998). But under recent interdependence such a withdrawal might have large effects on international trade, foreign relations and, in extreme cases, peace. This would be a sort of social sanctioning, but to me this does not seem probable due to the interdependence. It would remain a question of power whether such sanction is affordable to any state. A “careful use of border tariff adjustments could compensate for price differentials resulting from differential efforts to cut emissions and, in turn, deter free riding” (Keohane/Victor 2010: 13). But due to the existing world trade regime such mechanisms would need to be “tightly linked” to the WTO, a connection not yet installed but envisioned by UNEP and WTO (ibid.).

The Montreal Protocol has shown that some kinds of pollutants can successfully be legally restricted (cf. World Meteorological Organization 2007). That could be an exclusion mechanism that makes it easier to protect the climate. But because the world economy still largely depends on the use of fossil fuels, I think such an exclusion

9 The main sources of emittance are: energy supply (25,9%), industry (19,4%), forestry (17,4%), agriculture (13,5%), transport (13,1%), residential and commercial buildings (7,9%), water and wastewater (2,8%). For more detailed information on the main causes of greenhouse gas emissions see (IPCC 2007: 36, 37)

10 The GHG emissions of about 20% of world population (Annex I states) exceed about four times the amount from the Non-Annex I states.(cf. IPCC 2007: 37).

regarding the other GHG could incrementally progress by innovating the supply, production and consumption structure e.g. with the use of renewables. This principle is largely (definition of resource and users) but not fully (exclusion mechanisms) implemented.

Thesis 1: The UNFCCC can be slightly more effective if the COP implements exclusion mechanisms for pollutants, pollution units or single sources.

3.2 Monitoring

> *"Monitors, who actively audit common pool resource conditions and appropriator behavior, are accountable to the appropriators or are the appropriators"*
>
> (Ostrom, 1990: 94).

Illustration: This principle has three major meanings. The first is that the resource must be monitored to facilitate a sustainable use. The second is that a monitoring of users' behavior is an important feature which facilitates compliance. The third is that monitors are accountable to their users and legitimacy of their actions is created. Imagine again the tribal fishing. The coastal tribe now knows that fishing salmon has a natural limit. But without monitoring the stock they cannot make use of this knowledge. They try not to surpass the maximum of recreation but are never sure that they do not. Taking into account that the changes are not observable while in progress, the consequences could already be drastic by the time the tribe notices that they have fished too much. Hence, the state of the resource is to be monitored. Imagining that they observe and take care of the salmon, another threat is that some of the tribe members try to maximize their personal benefit. They try to free ride the efforts of the others. The free riders fish as much as they can. Although most tribe members fish less than before, the total amount of salmon still diminishes. Without monitoring the behavior of all its members, the tribe does not know why that happens. Now, imagine they observe both salmon and fishermen. They take care of a stable amount of fish and ensure that no one rides free. What if the monitors take advantage of their positions and fake the results? They can easily become the new free riders.

Function: The main reasons for this principle are to have a) knowledge of the resource's state and b) a reliable base from which free riding is observable. Under conditions of short term risk aversion, rational actors will not seek to maintain the resource until some security is given that others cooperate. Monitoring the status of the resource, users' behavior, and aggregated use provides both this security and the information needed for

making decisions about use and maintenance. That monitors are accountable to the appropriators also means that information provided must serve the needs of decision makers. Once again epistemic quality is required: “informational systems that simultaneously meet high scientific standards and serve ongoing needs of decision makers and users are particularly useful” (Dietz/Ostrom/Stern 2003: 1908).

Adaptation: Since the global climate system depends on many subsystems (cf. IPCC 2007), monitoring must be applied not just at the global level but at all different levels. Smaller scales must also be monitored because “highly aggregated information may ignore or average out local information that is important in identifying future problems and developing solutions” (Dietz/Ostrom/Stern 2003: 1908). Still, this aggregation is needed as the informational base of decision making on the global level. Monitoring must be aggregated for the global level, while adequate monitoring of smaller scales can provide important information, especially for decisions about the use of smaller scales. There can also be regional effects of a changing climate, such as the vulnerability and resilience of coastal life.

This principle is also buttressed by recent regime theory. Helmut Breitmeier states that “[s]cientific monitoring of the causes and effects of an environmental problem […] leads to the collection of additional information that would be unavailable or less complete if states did not coordinate national monitoring [...]” (Breitmeier 2006: 448).

Implementation: The IPCC is an important actor for providing information for decision makers. It assesses the load of information gathered by a large epistemic community and synthesizes it in its reports. But it is not an institution of the UNFCCC. It was created in 1988 by the UN Environment Program (UNEP) and the World Meteorological Organization (WMO). Today it is not fully accountable to the decisive body of the UNFCCC, the Conference of the Parties (COP), but it largely depends on the finances of either the Convention or individual state members (cf. UNFCCC 2006). There are institutionalized cooperations between subsidiary bodies of the Convention like the secretariat or the Subsidiary Body for Scientific and Technological Advice (SBSTA). With the latter it is a member in a joint working group. It also creates shorter working papers, some at the request of COP or SBSTA (ibid.).

Beyond the IPCC the WMO is also the creator of the Global Atmosphere Watch, an institution monitoring Earth's atmosphere on global and regional scales. Plenty of terrestrial stations and satellites continuously observe our planet, its temperature, weather, water, and the state and quality of its air. Furthermore, many independent

meteorological, climatic, and environmental institutions monitor the climate system on many scales. This information is gathered and monitored, providing the basis for political decisions in several layers. Recent years have seen an upward trend of scholarly research about climate, environmental protection and sustainability. These case studies provide information for decision makers mainly on a less than global scale, but they definitely have impact on political decisions among regions.

Regarding the monitoring of users' behavior the UNFCCC requires national communications about emissions, removals of sinks, and for developed countries about reduction measures (United Nations 1992: Article 12). The Subsidiary Body for Implementation (SBI) assists the COP with the implementation of the Convention and future decisions. It has a central role "in monitoring and, for example, reviews reports and reporting" (cf. Paavola 2008: 329). It shall "assess the overall aggregated effect of the steps taken by the Parties in the light of the latest scientific assessments concerning climate change [and] [...] [c]onsider the information communicated" (United Nations 1992: Article 10). It shall assist the COP in implementing reviews regarding the promotion of a sustainable management, conservation, enhancement and appropriate cooperation (ibid: Article 4(d)). Its expertise lies in financial and administrative matters (cf. UNFCCC 2006). Hence Article 5 of the Convention, by which "Parties shall […] [s]upport and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation" appears to be realized (United Nations 1992).

This principle is fully implemented and the monitoring features of the UNFCCC meet a high standard. But this does not mean that there is no need to develop the monitoring instruments further or make them more accountable. The accountability (cf. Newell 2008) of individual states' reductions of GHG emission to other actors such as states and non-state actors (cf. Price 2003; Okereke et al. 2009) was a contradictory issue at the COP 15 in Copenhagen (cf. Guérin/Wemaëre 2009).

Thesis 2: The UNFCCC has developed a largely effective monitoring system.

3.3 Congruence between appropriation and provision rules and local conditions

"Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labor materials, and/or money"

(Ostrom 1990: 92).

Illustration: This principle has three elements that need to fit each other: rules of a) appropriation or withdrawal of benefits and b) provision or distribution of costs and c) the local conditions regarding appropriation and provision. Let me turn back again to the lake clans. By chance they figured out that a little river flows from the lake into a second smaller lake. They understand the maximum amount of fishing that can occur in both lakes, and they observe and monitor the fish and the behavior of the tribes. But the second lake's allowed fishing is not sufficient to aliment one of the tribes, so there is no chance that one of the clans will entirely move to the second lake. And the costs are high: they need to walk almost half a day (or night) to get there and cannot forage any other food in the meantime. They agree that this walk is compensated by a slightly larger withdrawal permission. They further agree to change who has to fish in the second lake every month. This serves as an illustration of what it means to set up rules that fit appropriation, provision, local conditions, and the overall sustenance.

Function: Rules of appropriation or withdrawal must ensure that the maximum sustainable yield is not surpassed. These rights of withdrawal can be distributed among the potential users. The costs associated with appropriation and sustenance must also be provided. Both need to fit each other and local conditions. The latter determine the options for benefits and contribution to the maintenance. I think these are basic requisites to a common rule of all included stakeholders. With any imbalance there will always be an incentive for free riding.

Adaptation: In the case of the climate system as a sink, appropriation is to be understood as emitting GHG. Provision of costs would be the costs to lower emissions. Local conditions – on the global scale, regional conditions – are the emissions caused by human activity and the capacity to provide any reduction.

In the case of the global climate the maximum level of pollution rights is to be set appropriately. The emission of greenhouse gases is mainly caused by energy supply, industry, forestry, agriculture, housing, and transport (cf. IPCC 2007). To lower emissions, this structure of supply, production and consumption must change. The need for financial capacity and technological knowledge to facilitate the change is a regional condition.

But it must also meet the overall global conditions. The maximum sustainable yield requires congruence between global conditions, the distribution of partial rights and

costs, regional conditions and capabilities. Bargaining such provision rules and appropriation has high transaction costs (cf. Coase 1960).

Implementation: Generally the UNCCC includes "common but differentiated responsibilities and respective capabilities and their social and economic conditions" (United Nations 1992: 1). Theoretically this is similar to congruence as defined by Ostrom's principle. The Copenhagen Accord chapeau lists more than 120 states agreeing to it[11]. The Copenhagen Accord names the 2° Celsius goal without any binding reduction goals. But the UNFCCC is legally binding member states to avoid the "dangerous anthropogenic interference with the climate system" (United Nations 1992: Article 2). Hence, the overall responsibility is commonly shared. Practically the intended legally binding follow-up reduction treaty in Copenhagen failed due to a lack of agreement on how these responsibilities are actually distributed.

Having a look at how the emissions are distributed regionally, the IPCC assessment reports show a significant difference (IPCC 2007). The states with the highest GDP per capita are the ones emitting the most[12]. While some economically developed countries made significant commitments in their reduction goals, other did not. The European Union announced an unconditional reduction of 20 percent of GHG emissions by 2020 compared to 1990 and 30 percent if others contribute similar ranges[13]. The USA offered to contribute about 4 percent in the same time span. Regarding the commitments of developing countries such as China, India and Brazil, there was substantial pressure from the United States. Australia also put conditionality on its reductions, demanding that developing countries such as the so called Basic states[14] commit to reductions. China announced its intent "to reduce the intensity of carbon dioxide emissions per unit of GDP in 2020 by 40 to 45 percent compared with 2005 levels, in order to address global climate change"[15]. India similarly announced a 20 to 25 percent energy intensity reduction per GDP. Most of the states submitted reduction goals as intended by the Bali Action Plan (cf. United Nations 2007). But the intended treaty did not become reality. One of the other conflicts was the accountability of actions. Because economically

11 See http://unfccc.int/home/items/5262.php (accessed on 24.05.2010)

12 USA/Canada emit 19%, Western Europe 11 %, Japan, Australia, East Europe and Russia 10 %, New Zealand 5% of world GHG emissions. Together these inhabit about 20% of world population and have an average of about 16 tons of CO_2 equivalents per capita while the other 80% percent (including Brasil, India, China) of world population produce an average of about 4 tons of CO_2 equivalents per capita (cf. IPCC 2007).

13 See http://ec.europa.eu/environment/climat/climate_action.htm (accessed on 22.06.2010)

14 Brasil, South Africa, India and China

15 http://www.china.org.cn/china/NPC_CPPCC_2010/2010-03/05/content_19527060.htm (accessed on 24.05.2010)

emerging countries made concessions on the verification of their actions (cf. Guérin/Wemaëre 2009), I assume that the main conflict remained the distribution of emission reductions. The right congruence between GHG reductions, financial contribution and regional conditions is a basic requisite for a common rule. Because this rule did not come into force I conclude that the congruency is not yet met.

But according to Article 11, " [a] mechanism for the provision of financial resources on a grant or concessional basis, including for the transfer of technology" is included in the Convention (United Nations 1992: Article 11). Such a mechanism contributes to the differences among regional conditions. Furthermore Article 4 states that all parties take "into account their common but differentiated responsibilities and their specific national and regional development priorities" (United Nations 1992: Article 4).There are intentions to realize such a transfer system. The EU and the United States offered a total sum of about $100 billion per year up to 2020 for mitigation and adaptation measures of developing countries (Guérin/Wemaëre 2009). Hence, the need for such congruence seems to be recognized. But it has not yet become a substantial part of current politics and awaits its realization. I conclude a minimal implementation of this principle.

Thesis 3: The UNFCCC can be more effective if the COP develops a congruence of emissions, costs of reductions, and regional conditions , or sets up a balancing finance and technology transfer system.

3.4 Collective-choice arrangements

"Most individuals affected by the operational rules can participate in modifying the operational rules"

(Ostrom 1990: 93).

Illustration: The basic meaning of this principle is quite clear. The ones who need to deal with the rules regarding sustenance of the resource are the adequate ones to modify them. Once again I use an example constructed with the tribes of the two lakes. Their elders became members of a trans-tribe council of several tribes in that region. The elder council serves as a conflict solver in cases when the night and day clans cannot agree. But it is easy to imagine some demand for the two clans to modify their day-to-day rules themselves, especially when a quick decision is needed. The clans who fish in the two lakes have the knowledge required to implement decisions. Because they monitor both use and resource they know how many fish there are and which tribesmen fish the most. Imagine if elders from other tribes who do not use the lakes were to

decide how the two clans have to use the lakes. How could the two clans reasonably accept this? Generally there is no need to make decisions on a higher-level than required, but there might be cases of conflict in which decisions rendered by a higher-level body are needed. When the clans figure out that there is another tribe fishing in ”their” lake, there may be some conflict. Peaceful constitution of a common rule regarding the joint use might require the inclusion of a higher level authority. Eventually this was the condition that led to the installation of the elder council.

Function: First, this principle provides relatively a) well-tailored rules regarding local conditions and b) low cost adaptation when conditions change. Second, the operational decision making procedures need to be embedded in a higher level framework. In her “institutional analysis and development framework,” Ostrom distinguishes three levels of decision making: the operational, the collective choice and the constitutional (cf. E. Ostrom 1999)[16]. This principle primarily refers to the decision making for operational, day-to-day rules of CPR use. Historically there has been a large debate about which decision making procedure, ranging from consensus to majority decisions to autocracy, best suits demands for effectiveness, autonomy, responsiveness or democracy.- This principle requires the inclusion of affected individuals in the modification of operational rules. Because *“[c]ollective choice rules affect who is involved in deciding about future rules and how preferences will be aggregated”*(Ostrom et al. 1999: 285), this principle needs to be implemented at the collective choice level. This in turn needs to be embedded in the constitutional level. Only then can this principle provide adequacy and low costs for decisions about operational rules.

Adaptation: Actors affected by the operational rules of reducing emissions are the ones who pollute the climate: energy suppliers, industry, agriculturists, households, consumers and others. According to the principle, these players need to be involved in modifying the operational rules. As states have the mandatory power to set up and implement the needed restriction and incentive policies at the national level, this principle mandates the inclusion of these actors in state decisions. This requires an installation of the principle on the state level. States as representatives of any other actors affected can then take the overall governance decisions to the international constitutional level. According to Ostrom's institutional analysis and development

16 “The processes of appropriation, provision, monitoring, and enforcement occur at the operational level. The processes of policy making, management, and adjudication of policy decisions occur at the collective-choice level. Formulation, governance, adjudication, and modification of constitutional decisions occur at the constitutional level” (Ostrom 1990: 52).

framework the COP is located on the constitutional level; it formulated the objective of the Convention and is responsible for any changes to it. Similarly the Members of the (Kyoto) Protocol (MOP) serve as the constitutional body of the protocol. Ostrom's principle refers to an inclusion of users affected by the operational rules into their modification. This does not require an inclusion at the constitutional level. The actors affected would not need to be involved in the COP/MOP decisions. But because the UNFCCC also decides who is involved in decision making, it is also located on the collective choice level. Furthermore the COP/MOP also adopts the operational rules for how the climate is to be protected, with the help of the other bodies of the UNFCC. The flexible mechanisms[17] of the KP fall under the responsibility of the MOP. Hence, Ostrom's principle would require an inclusion of the actors that are affected e.g. by the emission trading system in the COP/MOP.

Implementation: The body of the UNFCCC consists of the ”supreme” conference of the parties (COP), its president, bureau, subsidiary bodies, the secretariat and other ad-hoc working groups and expert-groups (cf. United Nations 1992).

The COP shall “agree upon and adopt, by consensus, rules of procedure and financial rules for itself and for any subsidiary bodies” (United Nations 1992: Article 7.2 (k)). As originally intended, any further decision making rules such as voting procedures lacked the needed consensus and never came into force. Hence, any decision-making “on matters of substance” requires consensus (UNFCCC 2006: 43).

I could argue that interest groups have an influence on the state level. At least in democracies, politicians depend on voting and thereby the interests of citizens, interest groups and organizations. Because the mechanisms of the Kyoto Protocol are to be implemented on the state level, I assume that at least in democracy the actors affected by the operational rules have little participation in modifying these rules. Furthermore the consensus decisions of the COP/MOP and the influence of interests groups on some state governments indirectly mean an inclusion in the operational decisions on the global scale. But not all states are democracies and actors affected in these states are not indirectly included. And “[i]n practice, negotiators representing developing countries cannot participate equally in decision-making” (cf. Paavola 2008: 330). Hence even democratic developing states (e.g. South American democracies) cannot provide a real inclusion of their societal interests.

17 Clean Development Mechanisms (CDM), Joint Implementation (JI) and emission trading system

There are some intents to include interests groups in UNFCCC negotiations (cf. Few/Brown/Tompkins 2007). In 2004 the Subsidiary Body for Implementation recognized the representation of NGOs, especially regarding balance by including attendance of developing countries' NGOs (cf. UNFCCC 2006: 64). There are many observing parties – energy suppliers, industry, agriculturists, transport companies, and civil society – that have interest groups present at the COP. They are lobbying their representative governments and other legally decisive bodies and can make statements at the COP. But although these statements and lobby activities might have some influence, these interest organizations are not formally included in the decisions. Tcktcktck, a strategic alliance of more than 220 large NGOs from environmental, faith, and humanitarian backgrounds,[18] submitted a petition signed by over 10,000,000 people calling for world leaders to sign a "fair, ambitious, and binding deal" (cited from http://tcktcktck.org/stories/handover[19]). Richard Prices (2003) commented that recent research on transnational civil society has shown that activists can have influence on environmental issues and even on "the state monopoly of coercion" (Price 2003: 598). But in this case civil society activism had no impact on a binding deal. I see a partial implementation of this principle because to a certain amount the actors affected have an influence on the modification of operational rules.

Thesis 4: The UNFCCC can be more effective if the COP adopts an improved inclusion of actors affected by reducing emissions and collective choice rules beyond consensus.

3.5 Minimal recognition of rights to organize

> *"The rights of appropriators to devise their own institutions are not challenged by external governmental authorities"*
>
> (Ostrom 1990: 101).

Illustration: This principle goes beyond the previous one. It is not just a matter of including the actors affected in the decisions on operational rules but a matter of a bottom-up construction of the respective institutions or at least a substantial sphere of self-organization on all scales. The elder council of the lake clans shall not harmfully interfere with the division of the clan's institution. It might serve as a locus for conflict resolution but it shall not take all the responsibility of creating their common arrangement. It can help to create it but must leave the rights of self-organization to the

18 see http://tcktcktck.org/partners/our-partners for a list of participating NGOS (accessed on 01.06.2010)

19 (accessed on 01.06.2010)

two tribes. Imagine if the elder council had the power and authority to set up the rules of the use of the two lakes. I think this would create more conflict than resolution. The legitimacy of actors not involved setting up such rules might be questioned. Another point is that the elder council does not gather often enough to implement quick decisions. Because it is not physically present on the two lakes it would also depend on transferred information. This might be another source of inappropriate decisions.

Function: The reason for this principle is to provide appropriateness of institutions. In a sense it is similar to a principle of subsidiarity by which the manageable is left to the respective institutions. Whenever there is no need for decisions at a higher level the right to self-organization of lower levels is not to be challenged.

There are several cases in which an external agency devised rules for a sustainable use and excluded successful former strategies to manage the CPR – for example, indigenous institutions in South America (cf. Dietz et al. 2003). Sometimes external legal authorities do not have the resources to enforce the rules needed to avoid an overuse (cf. Dolšak/Ostrom 2003). Although there is no proof of which kind of ownership best meets the criteria for sustenance of the resource, self-organization should not be excluded (ibid.). Centrally important is that external authority does not undermine the capacity of local or regional appropriators to "sustain a rule-governed CPR" (Ostrom 1990: 101).

But this principle does not exclude that higher authorities support the local institution. There are cases in which external authorities can effectively support the sanctioning institutions (cf. Baland/Platteau 1996). Still, support is quite different from undermining local authority. It is important that a central authority and a local CPR governance do not conflict in the sustenance of the resource. Of course they can cooperate in some ways as long as the sustenance is not endangered by the external authority. Hence, the self-organization helps to create adequate protection of the CPR.

Adaptation: This time there is no special adaptation needed. What can be derived from this principle for global climate protection is that a) whenever needed, lower levels should also maintain options for self-organization and b) the rules set up on the highest global level should not conflict with any successful protection mechanisms on lower levels. But this implies that an overall congruency of adequate levels of implementation is also to be created.

This principle is also supported by recent regime theory. A multilevel governance framework that enables locally led bottom up, nationally led top down, and horizontal

linked policy transfers achieves more efficient local implementation of climate protection strategies (cf. Corfee-Morlot et al. 2009).

Implementation: States are formally sovereign units and can definitely self-organize their activities. Any submission to international agreements is voluntary,besides some pressure that might arise from interdependence. There is no superior body that can challenge the institution devised by states, the UNFCCC. So far this principle is partially implemented. But the UNFCCC rules should not conflict with any successful maintenance initiatives on lower scales. Because states function as the decisive bodies enacting their national programs according to the UNFCCC goals, they should facilitate a minimal recognition of rights to organize. According to Article 6 of the Convention the Parties shall "[p]romote and facilitate at the national and, as appropriate, subregional and regional levels, and in accordance with national laws and regulations, and within their respective capacities:" inter alia public participation (United Nations 1992: Article 6).

In turn I shall discuss two examples of how other actors engaged in and affected by climate protection can or cannot self-organize and how the UNFCCC is related to them.

Cities are major locations for GHG emissions, for about 78% by some accounts (cf. Stern 2007). There are several networks of cities like the C40 network of the largest global cities or the Climate Alliance for European cities addressing mitigation of GHG emissions, adaptation strategies and policy learning for climate change. In Copenhagen the C40 organized a parallel summit for mayors. They stress that they are willing to act but "[n]ational [g]overnments need to **engage** more closely with their city leaders, whose responsibility for critical services mean they are best placed to deliver GHG emissions reductions" (cited from http://www.c40cities.org/about/goals.jsp[20]). This shows that state decisions on the COP 15, according to the C40 perspective, do not sufficiently include cities' willingness to act. But there are some trends of national governments working more closely with local governments (cf. Corfee-Morlot et al. 2009). Although C40's self-organization does not really affect COP decisions, their right to organize mitigation actions themselves is not challenged. They can successfully implement their own actions. But there is a contrasting case.

Some business leaders also want to fight climate change. For example, the United States Climate Action Partnership (US-CAP)[21], the German Industry Organization (BDI)[22], and

20 accessed on 01.06.2010
21 see http://www.us-cap.org/ (accessed on 01.06.2010)
22 see http://www.wirtschaftfuerklimaschutz.eu/index.asp (accessed on 01.06.2010)

the Combat Climate Change (3C)[23] – all business organizations and initiatives of major companies – see climate protection as a chance for future economic growth. They stress the importance of market oriented mechanisms and economic opportunities. I think it is important to take into account that the structural competition of world markets leaves disadvantages to those who individually implement measures of reduction due to the related costs. Until there is no regulation for the entire market, any unilateral reduction efforts by business actors are unlikely to be made because they would suffer disadvantages by doing so. Their rights of self-organization are challenged by the absence of a comprehensive regulation of the global markets. The UNFCCC regime challenges other initiatives due to its own lack of effectiveness. Some self-organized actions are not challenged by the COP decisions others are, especially business initiatives. Hence, this principle is partially implemented.

Thesis 5: The UNFCCC can be more effective if the COP decisions do not challenge any division of institutions that can mitigate emissions.

3.6 Conflict resolution mechanisms

"Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials"

(Ostrom 1990: 100).

Illustration: Whenever conflicts arise they can be resolved by institutionalized mechanisms. The access to these mechanisms is to be structured without any limitations of either time or cost. Returning to the example of the tribal fishermen, imagine that there is some ambiguity between the members of the night and day clans about the amount of compensation for fishing in the second lake. It endangers the sustenance of the fish population when this conflict remains unsolved. The ones who think the compensation should be higher are tempted to fish more than allowed in the second lake. Mechanisms to resolve conflicts easily should be installed.

Function: In the distribution of costs and benefits of a CPR use there are likely heterogeneous interests among the members. Ambiguity, interdependence, inequality, inappropriateness of distribution and perceptions of injustice can cause conflicts. To facilitate collective choices regarding the operational rules, effective conflict resolution mechanisms are needed. One solution might be bargaining (packet) solutions, but they

23 see http://www.combatclimatechange.org/www/ccc_org/ccc_org/224546home/720282thex3/index.jsp (accessed on 01.06.2010)

accrue transaction costs. Through local arenas – close to the members and thereby a rapid access – these transaction costs can be lowered. Ostrom states that leaders are often the "basic resolvers of conflict" (Ostrom 1990: 100). Another solution is courts (ibid.). This means that there are formal and informal ways of conflict resolution. The most important function of this principle is that conflicts are solved through institutionalized mechanisms, easy to access and relatively low in cost. Otherwise the sustainable use might be endangered.

Adaptation: Regarding the climate protection regime there are several sources of possible conflict. Due to culture, power, or capacity related differences conflicts easily arise. Also there might be conflict between bodies of the UNFCC or sub-national and national levels of politics. This principle has an important role in the climate regime negotiations.

Implementation: The UNFCCC includes conflict resolution mechanisms under article 14.

> *"Parties concerned shall seek a settlement of the dispute through negotiation or any other peaceful means of their own choice […] [e.g. by] (a) Submission of the dispute to the International Court of Justice; and/or (b) Arbitration in accordance with procedures to be adopted by the Conference of the Parties as soon as practicable, in an annex on arbitration"*(United Nations 1992: Article 14).

The question is whether these conflict resolution mechanisms are as easy to access and low in cost as Ostrom indicated in her principle. Neither submitting the dispute to the International Court of Justice nor the arbitration mechanisms as foreseen by article 14 has yet been attempted. The latter has not even been adopted by the COP (UNFCCC 2006). Furthermore, conciliation is a non-binding conflict resolution mechanism, but the COP has not yet adopted any annex on conciliation, either (ibid.). Hence, some difficulties come along with the conflict resolution mechanisms included in the UNFCCC.

Settling disputes in any peaceful manner is very substantial in my eyes. Negotiations under unanimity generally cause high transaction costs and "prevent users from searching for better rules at relatively lower costs" (Ostrom 2008: 15). Easy access seems to be present; the ongoing intersessions in Bonn facilitate constant local access to negotiations processes. So, examining the formal conflict resolution mechanisms, this principle is at best partly implemented. As Ostrom stated, there might also be informal ways of conflict resolution. Bargaining packet solutions are of high cost and part of the

formal negotiations. But leaders often function as basic resolvers of conflict (Ostrom 1990; Davy/Simão Seixas 2008). Since the group that negotiated the Copenhagen Accord[24] has to some extend functioned as a leader but their exclusive negotiation results have just been recognized by the COP, I assume that at this time these informal conflict resolutions are not fully working, either. I discuss the leadership in a separate section (see 3.2.1)

For larger CPR institutions Ostrom's design principles cover nested enterprises[25] for conflict resolution mechanisms. On scales lower than global, i.e. on state levels and below, there are conflict mechanisms institutionalized by courts among many member states. The implementation of this principle is mostly missing on the global scale. The installation of an effective climate protection could prevent conflicts like climate related migration (cf. Tänzler/Oberthür/Carius 2002). In summary, this principle is partially implemented.

Thesis 6: The UNFCCC can be more effective if the COP embodies conflict resolution mechanisms beyond a peaceful manner by using the international court of justice amending annexes that cover arbitration and conciliation mechanisms.

3.7 Graduated sanctions

> *"Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending in the seriousness and context of the offense) by other appropriators, by officials accountable to these appropriators, or by both"* (Ostrom 1990: 94).

Illustration: Once a rule is broken the violator has to suffer consequences related to the quality of the rule breaking. Once again, imagine the tribal fishermen. A person grabs more fish than allowed. Without any punishment there is incentive for the others to do the same.

Function: To facilitate mechanisms that enforce compliance, first of all the compliance must be monitored and a non-compliance must be observable. A compliance then becomes "quasi-voluntary because the non-compliant are subject to coercion – if they are caught." (Levi 1988: 52 as cited in Ostrom 1990: 94). That the monitors are accountable to the appropriators or are the appropriators means that they are responsible to all users. This can create both legitimacy of and compliance with the rule. Monitoring

24 mainly China and USA (cf. Guérin/Wemaëre 2009)
25 see 3.1.8

non-compliance of all users leads to a public awareness of the free rider. It is then a matter of social capital (cf. Putnam 2000) and the norms of reciprocity and trustworthiness lower transaction costs in reaching agreements and monitoring compliance (cf. Baland/Platteau 1996; Ostrom 2009a). A difficulty lies in that sanctioning is costly to the punisher while the benefits of punishment are diffusely distributed over the members (cf. Elster 1989). A mutual sanctioning or mutually agreed upon punisher who is paid by the members can distribute the costs of punishment among the members. Ostrom states that in long-enduring CPRs costs are "low due to the rules of use" (Ostrom 1990: 95). As to the free riders problem, some kind of rule must enforce that beneficiaries contribute to the costs of sustenance and not overuse the resource. Besides the existence of such a rule, compliance with the rule matters. Graduated sanctions are a way of gaining compliance.

Adaptation: Regarding global climate protection, no special adaptation of this principle is required.

Implementation: By the Bonn Agreements and the Marrakesh Accord the UNFCCC adopted a compliance regime and an enforcement branch[26]. The enforcement branch consists of the Subsidiary Body for Implementation (SBI) and the Compliance Committee (CC) is fully accountable to the COP/MOP. For the Kyoto Protocol it meant an installation of the Compliance Committee observing, promoting and enforcing the compliance of states with their reduction goals according to the Kyoto Protocol.

Reviewing the national reports of Kyoto Protocol Annex A states, the Compliance Committee examines whether system requirements are met. System requirements are about reliable information regarding monitoring and accounting of GHG emissions and a national registry for emission credits. If any state does not fulfill these system requirements it is excluded from the carbon market system (CDM, JI and Emission trading). It cannot sell or buy any pollution units or credits nor cooperate with other states. To date this has happened to Greece, Canada, Croatia and Bulgaria. The Compliance Committee decision is not yet directly linked to the question of whether state A is going to fulfill the 2012 reduction goals. Although not likely to succeed, it can still manage to meet the assigned reduction goals. Any state that does not fulfill the 2012 Kyoto Protocol reduction goals within 100 days of the deadline will have to make up the difference plus 30 percent. Compensating for such a shortfall in this tight timeframe is unlikely if a country can neither buy credits nor cooperate with other

26 see http://unfccc.int/cop7/ (accessed on 08.06.2010)

states. Further consequences of non-compliance with 2012 reduction goals are still to be defined. Considering states as strategic actors, there might be some incentives to use the structure of the Kyoto-Protocol decision rules[27] to avoid sanctioning non-compliant states (Hagem et al. 2005). The "[Compliance Committee] has realized significant achievements, including the full development and putting into operation of the compliance system that existed only on paper in 2006" (Oberthür/Lefeber 2010: 154).

Besides this formal procedure, another method of graduated sanctions is "naming and shaming" or social sanctioning. By reciprocity and monitoring non-compliance a public awareness can enforce compliance with the agreed upon goals (Keohane/Victor 2010). For example, the Group of 77 and China have submitted many warnings of potential non-compliance with the Kyoto Protocol 3.1 to Annex I states. Their intent is to ensure that Annex I states do not exceed the assigned GHG amounts[28].

Insofar as the enforcement branch is fully accountable to the COP/MOP and non-compliance is monitored and soft forms of formal and informal sanctions exist, this principle is partially implemented. But Ostrom named graduated sanctions, implying further measures like financial or judicial sanctions. Although these are part of the UNFCCC they have not yet been used. Free riding also remains a danger for the total amount of emitted GHG because any ratification of the Kyoto Protocol is voluntary. No state can be forced to take part in the treaty to reduce emissions. The USA with the largest per capita emissions and China with the second largest total amount of GHG emissions do not take part. States and other parties can make a complete withdrawal from the agreement without suffering any formal consequence, so there is an exit option for strategic players. Because exits from the KP would lower the total reduction amount of the protocol, any state with an interest in climate protection has an incentive to advocate moderate sanctions. There is mild implementation of this principle, especially due to the exit option.

Thesis 7: The UNFCCC can be more effective if the COP strengthens the compliance mechanisms, adopts stronger sanctions or deletes the exit option for states involved.

27 It adopts a decision by 1) ¾ majority *and* 2) double majority of Annex I and Non-Annex I states, It members are representatives of the five UN regions (Africa, Asia, East Europe, Latin America, Western Europe and other States) and 1 small island state, 2 Annex I and 2 Non-Annex I states (Hagem et al. 2005).

28 see http://unfccc.int/playground/items/5516.php (accessed on 08.06.2010)

3.8 Nested enterprises

> *"Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises"*
>
> (Ostrom 1990: 101).

Illustration: This principle is especially needed by larger CPRs. Recurring again is the metaphor of the tribal fishermen. By exploring the coastal tribe, the night clan and the day clan got to know each other. They figured out that the river flows from its source to the lakes of the clans and then to the coast, They are all fishing in the same river. The clans of the two lakes started to catch more salmon than before by using the second lake. Each tribe has organized reliable monitoring and graduated sanctions and would not overuse the salmon if it were the only tribe fishing. But there is an accumulated overuse. So what might be a possible solution? They need an overarching framework that covers salmon fishing in the entire river. Due to the several loci where salmon are caught they also need to delegate some decisions to a higher level body. For example, the elder council can decide the total amount of salmon that can be withdrawn and how the fish can be distributed among the tribes. But the monitoring, enforcement, and sanctioning might need to be organized within the small local institutions, especially if the elder council does not have the capacity to realize all those activities.

Hence, all the activities that cannot be realized on local levels need to be delegated upward. The overarching institution needs to embed the smaller scales within a comprehensive but not fully centralized framework.

Function: The larger the resource, the greater the need for an organization of small interconnected units and multiple levels. Structuring into smaller units helps to reduce the complexity of both resource use and institutions. The differentiation into manageable units allows a greater steering capacity and avoids an overall overuse. The organization along multiple layers and nested enterprises is such a structure that "all of the more complex, enduring CPRs" share (cf. Ostrom 1990: 101). Taking into account the principles of "minimal rights for self-organization," only the organizational activities need to be delegated to a higher level body.

Adaptation: Local, regional, and global levels have specific conditions and needs which must be taken into account for an effective institutional design (cf. Dolšak/Ostrom 2003). In her "polycentric approach to cope with climate change," Ostrom argues that a polycentric structure is helpful to address and identify these conditions in each layer

(Ostrom 2009b). Instead of a monocentric hierarchy, a polycentric structure allows different elements of these nested institutions to mutually adjust (cf. V. Ostrom 1999). This mutual adjustment or adaptation is needed for an adaptive governance structure because biophysical and social systems change (cf. Dietz/Ostrom/Stern 2003). It is not a fixed structure but a flexible and adaptive governance system. The nested institutions are connected vertically between levels and horizontally within levels. These linkages can cause tensions at various levels depending on characteristics of resources and users (cf. Dolšak/Ostrom 2003). The more interconnected the resource users, the greater the need for nested institutions (ibid.). Although different, they all need to facilitate a sustainable use of the resource in their own sub-level and in the overall system. A regime on the global scale shares multiple levels of nested, polycentric and semi-autonomous institutions or sub-regimes. This principle is reinforced by recent regime theory. David Victor and Robert Keohane (2010) state that a regime complex might be more effective if the sub-regimes meet standards of "coherence, effectiveness, determinacy, sustainability, accountability, and epistemic quality" (Keohane/Victor 2010: 3, see also 19, 20).

Implementation: The Kyoto Protocol (KP) includes national programs for meeting its GHG reduction commitments. The UNFCCC and the KP have standardized methods for national inventories to meet national reduction goals and clean development mechanisms facilitating implementation and monitoring (cf. Paavola 2008). But they do not formally include any sub-national programs for reducing GHG emissions. The reporting standards differ among Annex I, Non-Annex I and least developed states.

Nested within the KP are the CDM, Joint Implementation (JI) and emission trading system. They are mechanisms of the arising global carbon market and illustrate bi- and multilateral inter-linkages between states and other actors engaged such as companies. "[CDM] is also anticipated to arouse business interest and engagement from the private sector into the issue of climate change mitigation via environmentally friendly investment, and ultimately help direct the host countries onto a lower carbon trajectory" (Huang/Barker 2009: 3). It will foster foreign direct investments for a green economy and projects for reducing GHG emissions. Hence, there are private/public partnerships engaged in financing and implementing the CDM and JI projects, but states have to report the projects and activities undertaken.

According to Keohane/Victor the UNFCCC could work as a comprehensive umbrella including the entire regime complex for climate change. There are several organizations,

agreements, initiatives, clubs and actors comprising the regime complex for climate change. The Montreal Protocol, the UNFCCC, subsidiary bodies, expert assessments like the IPCC, development banks, and the Global Environmental Facility (GEF), uni-, bilateral, and national and regional initiatives are all parts of this complex. That these institutions all cover specific functions of the overarching climate protection such as monitoring (IPCC), funding mechanisms (GEF) and enforcement (SBI) leads me to the conclusion that this principle is partially implemented.

Thesis 8: The UNFCCC can be more effective if it works as an umbrella that covers the fragmented regime complex for climate change.

3.9 Summary

Having reviewed Elinor Ostrom's original institutional design principles for successful management of CPRs, I have found out that the UNFCCC shares most of the design principles but to a different degree (see table 1 for a list).

Table 1: Empirical implementation of Ostrom's design principles in climate protection

Design principles	**Implementation**
clearly defined boundaries	largely
monitoring	fully
congruence between appropriation and provision rules and local conditions	little
collective choice arrangements	partly
minimal recognition of rights to organize	partly
conflict resolution mechanisms	partly
graduated sanctions	little
nested enterprises	partly

Long-lasting and robust CPR management systems share most of Ostrom’s design principles, which are central conditions of success in the management of CRS use. As analyzed, the UNFCCC shares all of them to a certain extent. CPR governance on a global scale requires these principles to be long-lasting, robust and successful. But measuring the UNFCCC by the 2° Celsius goal, the current protection mechanisms are not effective. Hence, there is a gap between the results expected by adapting Ostrom's principles and the measurement of effectiveness. Generally, the global climate is in clear danger of being overused (cf. IPCC 2007) and therefore is more likely to be effectively managed and sustained (cf. Ostrom 2002).

4 Extending the design principles

Why does the UNFCCC share almost all of Elinor Ostrom's institutional design principles yet not provide effective climate protection? Generally up-scaling the principles, the analysis of their implementation and the measurement of effectiveness might be possible sources for this gap. I will briefly discuss each in turn.

Scaling-up problem: "Having larger numbers of participants in a CPR increases the difficulty of organizing, agreeing on rules, and enforcing rules" (Ostrom et al. 1999: 281). The climate can be seen as a CPR problem at the largest scale. The insights from lower levels can provide some information on how it might effectively be protected, but they definitely need to be adapted to provide successful CPR management. Simply up-scaling the principles does not seem to be sufficient. There is not yet much literature available on qualities of effective CPR-governance on the global scale[29]. Wherever possible I backed up the principles with insights from current regime theory. Whether the adaptation I pursued is reasonable is left for future researchers.

Implementation analysis problem: I find the result that most principles are partly implemented is consistent with the sheer existence of the UNFCCC and its ongoing development. That not all of the principles are fully implemented leads me to the assumption that it might just be a condition that 'helps' for the success. The analysis of the implementation of Ostrom's institutional principles leads me to the conclusion that the UNFCCC climate protection as a CPR-governance is likely to be long-lasting, robust and effective. Long-lastingness and robustness will show up over time. What about the effectiveness?

Measurement of effectiveness problem: The Kyoto Protocol is the only binding reduction treaty without reduction commitments from all its participants. Having a glance at the emissions of the KP Annex I states, the total reduction goals are not yet met. But the total amount of Annex I GHG emissions has been stabilized[30]. "[D]eveloped-country parties to the Protocol, as a group [except Canada], seem to be on track to achieving the overall target of reducing their greenhouse gas emissions" (Oberthür/Lefeber 2010: 155). Hence, the KP provides some effectiveness. The overall goals may still be met by 2012. I assume that effectiveness can be rated by the degree to which the principles are implemented. Effectiveness might be better measured not just by the quantity but also by the quality of implementation.

29 Exemplary studies are provided by Jouni Paavola (2008) or Farell/Morgan (2003)

30 See http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php (accessed on 21.06.2010)

Anyhow, the effectiveness of the UNFCCC does not depend exclusively on the emissions of Annex I states but also on the overall emissions. I submit that an overall reduction of GHG emissions is needed to protect the climate from ”dangerous” global warming (cf. IPCC 2007). According to the current paradigm, wealth and development depend on economic growth. A growth of both population and economy causes an increased emittance of GHG due to the augmented use of fossil fuels (cf. IPCC 2007). The Bali Action plan reaffirms that “economic and social development and poverty eradication are global priorities” (United Nations 2007: 1).

But the total emittance of GHG needs to be reduced to sustain the climate system. Poverty eradication and other UN millennium goals cannot be fulfilled if the economically developed countries do not reduce more GHG emissions than the developing states need to grow economically. One way they could begin to reduce such an unlikely amount is financial and knowledge transfers into developing countries, by which the emittance of GHG needed for economic growth in developing countries could be lowered. The developed countries would have to reduce less but still as much as the developing countries need to grow. I think it is this situation that makes the emergence of a binding, comprehensive follow-up treaty so difficult.

Deriving the key points the regime for climate protection is ineffective due to a lack of a) congruence of emissions, costs for reduction and regional conditions and b) graduated sanctions. I think the graduated sanctions only make sense when a comprehensive follow-up treaty has come into play. The lack of congruence is the main reason for conflicts that hinder the creation of such a treaty. Examining how this congruence could be implemented, I reference further studies of International Relations (IR) and CPR management. Especially because there is not yet much academic research on the highly complex climate system management some further insights seem quite necessary. “The tough task ahead is to do the exacting empirical and theoretical work to identify which of these principles scales up to larger size and what new principles have to add” (Ostrom 2008: 16). Arun Agrawal has presented an overview of three different approaches to study common pool resource management by Elinor Ostrom, Jean-Marie Baland and Jean-Philippe Platteau, and Richard Wade (cf. Agrawal 2003). Often they name similar details of resources, user characteristics, institutional arrangements and external environment. I include the following additional institutional design principles because I assume that congruency can be facilitated by a leader who moves first and arranges alliances or by a shift in the shared norms or by both. I discuss each in turn.

4.1 Leadership

In many IR related studies power is one of the most central issues. Power also plays an important role in climate protection. The power of states is defined by military and economic power[31]. The current economy largely depends on the use of fossil energy (Stern 2007). Hence, the issue of reducing emissions is related to power. I include leadership as an additional design principle.

Illustration: Imagine that the coastal tribe and the lake clans cannot agree on how resource use is distributed. The elder council is consulted, but they can't reach a consensus on how to solve the basic conflict.. How can the tribes create a common rule? If one group moves first and binds themselves to cooperation they can lead the negotiations to the needed outcome. But it would not be a leadership by power but by moving first and making an "offer that cannot be refused"[32].

Function: Ostrom mentioned that leaders are often the "basic resolvers of conflict" (Ostrom 1990: 100). Studying the success of local common pool resource management, Jean-Marie Baland and Jean-Philippe Platteau (1996) find that relatively young leaders with experience from the outside world who collaborate with traditional structures play an important role. Such a leader will a) set up sanction mechanisms to punish free riders and b) "bind himself to cooperation in order to bring the weak party to cooperate" (Baland/Platteau 1996: 87).

Adaptation: Regarding climate protection I assume that states or other actors with innovative ideas and respect for agreements can play an important role in the success of a regime. This principle must not conflict with any other principle. Neither should it undermine the self-organizing capacity of the entire community of appropriators nor the accountability of monitors and officials who manage graduated sanctions of all appropriators. A leader in this sense should also be accountable to operational rules set up by a mutual agreement. Responsiveness of the leader is needed then to facilitate the nested, self-organizing structure of a large, commonly managed CPR. The role of leadership in climate protection can be very diverse. It can function as a basic resolver of conflict (cf. Ostrom 1990), as a coercive creator of cooperation (cf. Baland/Platteau 1996), or as a benevolent coordinator (cf. Lindenthal 2009).

31 For two contrasting positions on how state power and international economy relate see Stephen Krasner (1976) and Susan Strange (1994).

32 Similar to Vito Corleone's famous saying in "The Godfather"

Implementation: In the negotiations surrounding the regime for climate protection there have been different leaders. In the creation of the Montreal Protocol the United States of America took this role successfully, but the US had mixed results in the UNFCCC and failed in the UN Convention on Biodiversity (CBD) (cf. Sussman 2004). Glen Sussman (2004) argues that both the UNFCCC and UNFCBD were lacking US support for international implementation. Although this has changed in recent years – major companies in the US are lobbying the Senate and Congress for a proactive reduction of GHG emissions (cf. United States Climate Action Partnership 2009) – President Obama has not yet acted toward a binding deal. The Copenhagen Accord, which was partly arranged by the USA, is based on voluntary GHG reductions.

The European Union has played a central role in climate protection since the 1990s and in the ratification processes of the Kyoto Protocol (cf. Oberthür/Roche Kelly 2008). It could certainly function as a potential leader in future negotiations. But there are contrasting indicators, too. In the COP 15 negotiations the conditional offer made by the European Union[33] has not led to the intended creation of a follow-up treaty. Although it signed the Copenhagen Accord, the EU did not take part in its development (cf. Guérin/Wemaëre 2009).

Beyond classical state leadership there are different approaches. Mikael Román analyzed the C40 Cities Leadership Group as an actor ”governing from the middle” (Román forthcoming). Other authors state that civil society can have relevant impact on climate protection policies (cf. Gulbrandsen/Andresen 2004; Newell 2008; Price 2003) and can sometimes be the driving force (cf. Hale 2010). But I assume that, although they may have an important role, the outcome at the COP 15 would have been different if these actors really had a strong influence. Hence, at the moment no state or other actor is taking the role of a leader in climate protection.

Thesis 9: In the creation of a binding follow-up reduction treaty, leadership can function as a basic resolver of conflicts over the congruence of emissions, costs of reductions and regional conditions.

4.2 Shared norms

Another broadly discussed aspect of the study of IR is the role of norms. In “Anarchy is what states make of it” Alexander Wendt (1992) illustrated that states’ actions shape the

33 20 percent unconditionally, 30 percent if other developed countries undertake similar measures. See http://unfccc.int/home/items/5264.php (accessed on 22.06.2010)

international system and that their perceptions of the international system shape how states act.

Illustration: Another solution to the basic conflict might be that the elders tell the tribes that they should take care of their children's future rather than shout at each other. If the three tribes understand what the elders mean and behave accordingly a common agreement might be reached more easily.

Function: The order of states' preferences shapes the outcome of rational political action. Whether the main interest is protection of the climate system or economic growth influences the regimes produced. The interests of states may change over time and thereby facilitate a change in political structure. Instead of interests Ostrom named the internal norms as one of four variables that shape an actor's strategic choices (cf. Ostrom 1990: 37). Baland and Platteau name shared norms as an important group characteristic for a successful CPR management (cf. Baland/Platteau 1996; Agrawal 2003). Whether shared or internalized, norms influence the management of common pool resources.

A shift in available knowledge about the environmental system and its endangerment may cause political changes (cf. Krasner 1982b) in the preferences or perception of the international system. Paul Sabatier stressed the importance of political learning for a change in coalition structures and political outcomes (cf. Sabatier 1988). Political innovation can improve conditions for sustenance of a natural resource. So structure of interests, available knowledge and shared norms can influence the success of climate protection.

Adaptation: There is no need for a special adaptation here since this principle already refers to the norms that states and other actors involved in climate change do or do not share.

Implementation: Since the Brundtland report sustainable development has become one of the most important issues on the global agenda. Even the OECD promotes "green" growth (OECD 2010). India and China have agreed to lower the energy intensity of their economic growth[34]. Hence the largest emitters share the norm to protect the climate. But it is also a matter of justice. According to the Brundtland definition, a sustainable "development [...] meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987: 54). Today many people cannot even satisfy their

34 See http://unfccc.int/home/items/5265.php (accessed on 21.06.2010)

most basic needs (cf. World Bank 2010). Hence, a sustainable development has not been reached yet. Neither the needs of this generation nor the needs of future generations can be met. Successful climate protection is just part of a more comprehensive framework of governance for a sustainable development. Due to the close link between development and economic growth an overuse of the climate cannot be avoided without a more fundamental shift in the norms regarding development. To meet present and future generations' needs political learning is required to provide more just distributions of burdens and chances to meet basic human needs. Assuming that humans to a certain extent behave rationally, the world governance structure has to provide rational incentives to behave sustainably. The actors who can provide such a structure are states, which must commit themselves step by step to more sustainable development. In summary I conclude that the norms regarding a protection of the climate tend to be shared. Beyond that, a substantial shift in the norms of the population within one powerful democratic state might be enough to create successful climate protection. Its government might then be able to take the leadership role in climate protection.

Thesis 10: A deliberated shift in the norms of how burdens for climate protection are distributed facilitates a change toward more effectiveness.

5 Conclusion

The primary goal of this work was to find out the reasons why the regime for climate protection is not effective. To that end I adapted insight from Elinor Ostrom's studies on a successful common pool resource (CPR) governance.

I discussed why the climate system management can be understood as similar to the original set of local or regional CPR management. I found them similar enough to adapt Ostrom's institutional design principles to the global level. Next I analyzed which of the design principles are already implemented in the United Nations Framework Convention on Climate Change (UNFCCC) and to what extent.

One of the main findings is that the UNFCCC shares most of the principles. According to Ostrom this characterizes the regime for climate protection as long-enduring, robust and successful. But it does not yet provide a reduction that meets the 2° Celsius maximum average temperature rise goal declared by the Copenhagen Accord. I assumed that the effectiveness of CPR management is hence to be measured not only by the quantity but also the quality of the implementation.

Just the monitoring principle is largely implemented. I formulated a series of thesis regarding the effectiveness of the UNFCCC including that it can be more effective by implementing exclusion mechanisms, including more stakeholders and self-organization, and by better conflict resolution mechanisms.

The principles that largely lack implementation in the regime for climate protection are a) congruence between the emissions, the costs for reduction and regional conditions and b) graduated sanctions. I concluded that the distribution of the UNFCCC's common but differentiated responsibilities remains the major conflict in the creation of a treaty that meets the 2°C-max goal. Graduated sanctions could then provide more effectiveness of a follow-up treaty.

Following I added two further institutional design principles from other CPR studies, mainly from Baland and Platteau (1996). I assumed that leadership in either climate protection or commonly shared norms provides resolution to the basic conflict about the distribution of burdens. Because at this moment no states seem willing to take such a leadership role, the solution must be a shift in the norms.

Norms of a sustainable development that allocates justice to present and future generations would provide the needed shift. And it might be the voting population within one powerful democratic state or regional economic organization like the EU that influences its government to behave accordingly.

Although this analysis indicates that the UNFCCC will develop further and sooner or later provide effective climate protection, it is still a question of how economic growth in the current economic crisis, unemployment and sustainable development are rated. This makes me think that by imposing norms of a sustainable development, the citizens of the world can make their governments protect the climate.

Finally, a couple of issues touched in in this work deserve further research. First, up-scaling the design principles to such a complex CPR as the global climate system is a difficult task. It requires more in depths studies. Second, does an implementation of the design principles on the global level indicate a high probability of success and robustness? Third, how can effectiveness be measured with regard to institutional design principles? Fourth, can leadership and shared norms function as additional design principles for a successful CPR governance of the global climate? Which role can (trans-)national civil society play?

References

Agrawal, Arun (2003): Common resources and institutional sustainability. In: Commitee On The Human Dimensions Of Global Change - Ostrom, Elinor/Dietz, Thomas/Dolšak, Nives/Stern, Paul C./Stonich, Susan/Weber, Elke (eds.), The drama of the commons. Washington, DC: National Academy Press pp. 41-85.

Baland, Jean-Marie/Platteau, Jean-Phillip (1996): Halting degradation of natural resources : is there a role for rural communities? Oxford: Clarendon Press .

Breitmeier, Helmut (2006): Institutions, knowledge, and change: findings from the quantitative study of environmental regimes. In Gerd Winter (ed.), *Multilevel Governance of Environmental Change*. Cambridge: Cambridge Univ Press, 430-452.

Coase, Ronald H. (1960): The Problem of Social Cost. In: *Journal of Law and Economics*, 3, 1-44.

Corfee-Morlot, Jan/Kamal-Chaoui, Lamia/Donovon, Michael G./Cochran, Ian/Robert, Alexis/Teasdale, Pierre-Jonathan (2009): Cities, Climate Change and Multilevel Governance. OECD Environmental Working Papers 14. OECD: Paris.

Davy, Brian/Simão Seixas, Cristiana (2008): Self-organization in integrated conservation and development initiatives. In: *International Journal of the Commons*, 2(1), 99-125.

Dietz, Thomas/Dolšak, Nives/Ostrom, Elinor/Stern, Paul C. (2003): The drama of the commons. In Commitee On The Human Dimensions Of Global Change - Ostrom, Elinor/Dietz, Thomas/Dolšak, Nives/Stern, Paul C./Stonich, Susan/Weber, Elke (eds.), The drama of the commons. Washington, DC: National Academy Press, 3-35.

Dietz, Thomas/Ostrom, Elinor/Stern, Paul C. (2003): The struggle to govern the commons: tragedy of the commons. In: *Science,* 302, 1907-1912.

Dolšak, Nives/Ostrom, Elinor (eds.). (2003): The commons in the new millennium : challenges and adaptation. Cambridge, Mass.: MIT Press.

Elster, John (1989): The Cement of Society: A Survey of Social Order. Cambridge: Cambridge University Press.

European Union (2010): The EU climate and energy package. Available at: http://ec.europa.eu/environment/climat/climate_action.htm (accessed on 22.06.2010).

Farell, Alexander. E./Morgan, M. Granger. (2003). Multilateral Emission Trading: Heterogeneity in Domestic and International Common-Pool Resource Management. In: Dolšak, Nives/Ostrom, Elinor (eds.), The Commons in the New Millenium: Challenges and Adaptations. Cambridge: MIT Press, 169-218.

Few, Roger/Brown, Katrina/Tompkins, Emma L. (2007): Public participation and climate change adaptation: avoiding the illusion of inclusion. In: *Climate Policy*, 7(1), 46 - 59.

Graßl, Hartmut/Kokott, Juliane/Kulessa, Margareta/Luther, Joachim/Nuscheler, Franz/Sauerborn, Rainer/Schellnhuber, Hans-Joachim/Schubert, Renate/Schulze, Ernst-Detlef (2003): Climate protection strategies for the 21st century: Kyoto and beyond. Report prepared by the German Advisory Council on Global Change (WBGU), Berlin: WGBU.

Gulbrandsen, Lars H./Andresen, Steinar (2004): NGO Influence in the Implementation of the Kyoto Protocol: Compliance, Flexibility Mechanisms, and Sinks. In: *Global Environmental Politics*, 4 (4), 54-75.

Guérin, Emmanuel/Wemaëre, Matthieu (2009): The Copenhagen Accord: What happened? Is it a good deal? Who wins and who loses? What is next? In: *Idées pour le débat*, 8.

Hagem, Cathrine/Kallbekken, Steffen/Mæstad, Ottar/Westskog, Hege (2005): Enforcing the Kyoto Protocol: sanctions and strategic behavior. In: *Energy Policy*, 33, 2112-2122.

Hale, Stephen (2010): The new politics of climate change: why we are failing and how we will succeed. In: *Environmental Politics*, 19 (2), 255-275.

Hardin, Garett (1968): Tragedy of the commons. In: *Science*, 162, 1243−1248.

Hisschemoller, Matthijs/Gupta, Joyeeta (1999): Problem-solving through international environmental agreements: the issue of regime effectiveness. In: *International Political Science Review/ Revue internationale de science politique*, 20 (2), 151-173.

Huang, Yongfu/Barker, Terry (2009): The Clean Development Mechanism and Sustainable Development: A Panel Data Analysis. Tyndall Centre for Climate Change Research Working Paper 130, Norwich: Tyndall Centre for Climate Change.

Intergovernmental Panel on Climate Change (2007): Climate Change 2007: synthesis report. Cambridge: Cambridge University Press.

Keohane, Robert/Victor, David (2010): The Regime Complex for Climate Change. Discussion Paper 2010-33, Cambridge, Mass.: Harvard Project on International Climate Agreements.

Keohane, Robert (1983): The Demand for International Regimes. In: Krasner, Stephen, International Regimes. Ithaca, NY: Cornell University Press, 141-172.

Krasner, Stephen (1976): State Power and the Structure of International Trade. In: *World Politics*, 28 (3), 317-347.

Krasner, Stephen D. (1982a): Structural causes and regime consequences: regimes as intervening variables. In: *International Organization*, 36 (2), 185–205.

Krasner, Stephen D. (1982b): Regimes and the Limits of Realism: Regimes as Autonomous Variables. In: *International Organization*, 36 (2), 497 – 510.

Le Quéré, Corinne/Raupach, Michael R./Canadell, Josep G./Marland, Gregg (2009): Trends in the sources and sinks of carbon dioxide. In: *Nature Geoscience*, 2 (12), 831-836.

Levi, Margaret (1988): Of Rule and Revenue. Berkeley: University of California Press.

Lindenthal, Alexandra (2009): Leadership im Klimaschutz: Die Rolle der Europäischen Union in der internationalen Umweltpolitik. Frankfurt: Campus Verlag.

Mearsheimer, John J. (2001): The Tragedy of Great Power Politics, New York: Norton.

Moravcsik, Andrew (1997): Taking Preferences Seriously: A Liberal Theory of International Politics. I accessed n: *International Organization*, 51 (4), 513-553.

Newell, Peter (2008): Civil Society, Corporate Accountability and the Politics of Climate Change. In: *Global Governance*, 8 (3), 122-154.

Oakerson, Ronald J. (1990): Analyzing the commons: A framework. Paper to be presented at the first meeting of the International Association for the Study of Common Property, September 28-30, Duke University, Durham, United States of America. Available at: http://dlc.dlib.indiana.edu/dlc/handle/10535/498 (accessed on 02.02.2010).

Oberthür, Sebastian/Roche Kelly, Claire (2008): EU Leadership in International Climate Policy: Achievements and Challenges. In: *International Spectator*, 43(3), 35-50.

Oberthür, Sebastian/Lefeber, René (2010): Holding countries to account: The Kyoto Protocol's compliance system revisited after four years of experience. In: *Climate Law*, 1, 133-158.

OECD (2010): Interim Report of the Green Growth Strategy: Implementing our commitment for a sustainable future - Meeting of the OECD Council at Ministerial Level. Paris: OECD.

Okereke, Chukwumerije/Bulkeley, Harriet/Schroeder, Heike (2009): Conceptualizing Climate Governance Beyond the International Regime. In: *Global Environmental Politics*, 9 (1), 58-79.

Olson, Mancur (1968): Die Logik des kollektiven Handelns : Kollektivgüter und die Theorie der Gruppen. Tübingen: Mohr.

Ostrom, Elinor (1990): Governing the commons : the evolution of institutions for collective action. Cambridge: Cambridge University Press.

Ostrom, Elinor/Burger, Joanna/Field, Christopher B/Norgaard, Richard B/Policansky, David (1999): Revisiting the Commons: Local Lessons, Global Challenges. In: Science, 284, 278-282.

Ostrom, Elinor (1999). Institutional rational choice - An assessment of the Institutional Analysis and Development Framework. In: Sabatier, Paul A. (ed.), Theories of the policy process. Boulder: Westview Press, 35–72.

Ostrom, Elinor (2002): Reformulating the Commons. In: *Ambiente & Sociedade*, 10, 1-22.

Ostrom, Elinor (2008): Polycentric systems as one approach for solving collective- action problems. Bloomington: Indiana University. Available at SSRN: http://ssrn.com/abstract=1304697 (accessed on 01.02.2010)

Ostrom, Elinor (2009): A general framework for analyzing sustainability of social-ecological systems. In: *Science*, 325, 419-22.

Ostrom, Elinor (2009): A polycentric approach for coping with climate change. Policy Research Working Paper 5095, Washington, DC: World Bank.

Ostrom, Vincent (1999): Polycentricity - Part 1. In: McGinnis, Michael. (ed.), Polycentricity and Local Public Economies. Ann Arbor: University of Michigan Press, 52-74.

Paavola, Jouni (2008): Governing atmospheric sinks: the architecture of entitlements in the global commons. In: *International Journal of the Commons*, 2 (2), 313-336.

Price, Richard M. (2003): Transnational Civil Society and Advocacy in World Politics. In: *World Politics*, 55 (4), 579-606.

Putnam, Robert D. (2000): Bowling alone : the collapse and revival of American community. New York: Simon & Schuster.

Román, Mikael (2010): Governing from the middle: The C40 Cities Leadership Group. Bingley: Emerald forthcoming.

Sabatier, Paul A. (1988): An advocacy coalition framework of policy change and the role of policy-oriented learning therein. In: *Policy sciences*, 21 (2), 129–168.

Stern, Nicholas (2007): The economics of climate change : the Stern review. Cambridge: Cambridge University Press.

Strange, Susan (1994): Wake up, Krasner! The World Has Changed. In: *Review of International Political Economy*, 1 (2), 209-219.

Sussman, Glen (2004): The USA and Global Environmental Policy: Domestic Constraints on Effective Leadership. In: *International Political Science Review*, 25 (4), 349-369.

Tsebelis, Georg (1990): Nested Games. Rational Choice in Comparative Politics. Berkeley: University of California Press .

Tänzler, Dennis/Oberthür, Sebastian/Carius, Alexander (2002): Climate Change and Conflict Prevention: The Relevance for the International Process on Climate Change. Background Paper for the Special Event "Climate Change and Conflict Prevention", Bonn, 10 June 2002, 16th meeting of the Subsidiaries Bodies UNFCCC.

UNFCCC (2006): UNFCCC handbook. Bonn: Climate Change Secretariat. Available at: http://.unfccc.int/resource/docs/publications/handbook.pdf (accessed on 21.05.2010) .

United Nations (2007): Bali Action Plan. Available at: http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf (accessed on 03/05/2010).

United Nations (1992): Framework Convention on Climate Change. Available at: http://unfccc.int/resource/docs/convkp/conveng.pdf (accessed on 03/05/2010).

United Nations (1998): Kyoto Protocol. Available at: http://unfccc.int/resource/docs/convkp/kpeng.pdf (access on 03/05/2010)

United States Climate Action Partnership (2009): A blueprint for legislative action. Available at: http://www.us-cap.org/PHPages/wp-content/uploads/2010/05/USCAP_Blueprint.pdfn (accessed on 01.06.2010).

Wendt, Alexander (1992): Anarchy is what States Make of it: The Social Construction of Power Politics. In: *International Organization*, 46 (2), 391-425.

Wicke, Lutz/Schellnhuber, Hans Joachim/Klingenfeld, Daniel (2010): Nach Kopenhagen: Neue Strategien zur Realisierung des 2°Max-Klimazieles. Potsdam Institute for Climate Research (PIK) Report 116, Potsdam: PIK.

World Bank (2010) World Development Report 2010 - Development and Climate Change. Washington, DC: World Bank.

World Commission on Environment and Development (1987): Our Common Future. Oxford: Oxford University Press.

World Meteorological Organization (2007). Scientific assessment of ozone depletion: 2006. Global Ozone Research and Monitoring Project, 50. Geneva: WMO.

Young, Oran R. (1999). The Effectiveness of International Environmental Regimes: Causal Connections and Behavioral Mechanisms, Cambridge, Mass.: The MIT Press.