Modelling Environmental Capacities of Nation States: Path dependencies and policy domains

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Abstract

The capacities of countries to cope with the challenges of global environmental change vary considerably. Some countries are earlier and their environmental policies are more ambitious than others. Based on earlier comparative case studies and conceptual models, we have developed a statistical model to describe and analyse environmental capacity of a country, as constituted by the strength, competence and configuration of the governmental and non-governmental proponents of environmental protection and the specific cognitive-informational, political-institutional and economic-technological framework conditions.

We expect capacities of countries to vary in different issue areas. A country might perform relatively well in climate policies, but is less ambitious in e.g. chemical policies or other issue areas. While a country might have built up expertise, competences, networks of actors etc. in a certain domain, it is lacking such conditions in another. This can be captured as path dependencies of environmental policies.

To explore the relevance of such path dependencies, we compare indicators of the policy performance of countries in two issue areas, i.e. climate change policies and nature protection policies. For the policy performance in climate policies we can take stock of previous work (Künkel/Jacob/Busch 2006). In this paper, we develop a similar approach to measure policies for the protection of nature and biodiversity. Both policy domains entail different actors, instruments and strategies.

Our indicator for policy performance in the respective issue area is an aggregated indicator of a count of different policy measures taken in the respective field as well as an analysis of qualitative comparative studies on the countries to determine the level of ambition. With this aggregation, individual preferences for specific instruments in a country can be levelled out.

We find a low to medium correlation between the two aggregate indices for climate policy and nature protection policy, meaning that countries that are more ambitious in climate policy tend to be more ambitious in nature protection as well.

Different components of environmental policy capacity are relevant in explaining climate policy and policies for nature conservation. While we find a range of political-institutional and actor related variables relevant for climate protection policy, and are thus fairly well able to explain climate policy, we find only few for the nature protection polices. Among the variables with explanatory power is the economic performance: strong economic growth is clearly related to poorer performance in biodiversity policy.

Results are preliminary especially since the sample size is very small to allow direct comparison of identical samples. However, we do find issue specific significant differences in the factors explaining the degree of ambition in the two policy fields. We conclude from this preliminary data that climate policy can be explained fairly well through our model of environmental capacities, whereas for biodiversity policy as measured by our index the explanatory power of our model is rather limited. This puzzle will need attention in future research.

Measuring and Analysing Policy Outputs

The capacities of countries to cope with the challenges of global environmental change vary considerably. Some countries are earlier and their environmental policies are more ambitious than others. As part of the research project "Modelling Environmental Policy Capacities"[1] the authors seek to measure and explain environemntal policies by means of large-n comparison. Large-n comparison requires the measurement of policy and capacities in quantitative terms for a large number of countries.

To measure the performance of countries in the field of the environment is by no means an easy task. Descriptive statistics of the performance of countries in tackling environmental problems are typically based either on environmental outcomes, i.e. the actual progress in reducing environmental problems like the reduction of greenhouse gas emissions, or on easily quantifiable overall targets to which governments have committed themselves, like greenhouse gas reduction targets (e.g. Scruggs 2003, Esty et al. 2006, Germanwatch 2006). However, these measurements have several shortcomings.

Firstly, the measurement by actual outcomes has serious shortcomings as it cannot be attributed to government action only, but instead it depends on national circumstances, such as economic growth and structure, level of economic and technological development, population structure and growth, or natural conditions. In other words, significant absolute or relative achievements are not necessarily the result of environmental policies, but can have a number of other causes, notably economic developments, technological innovations, demographic factors, weather, etc.. The establishment of a precise causal link between policies and ecological impact is a general problem in policy evaluation. In climate policy, for example, Esty et al. (2006) find that when measuring performance in climate policies at the global level as progress in the absolute reduction of carbon-dioxide emissions in particular the poorest nations without ambitious climate policies rank first and observe that the "most 'successful' countries all achieved their emissions reductions by means of economic collapse rather than a focused [greenhouse gas] control policy".

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Secondly, the measurement by the environmental goals does not reveal if the governments really take serious action for their achievement. The reduction target may be symbolic only, and no effective action is taken. In their review of national reduction targets for greenhouse gas emissions, Binder and Tews (2004) show that most countries failed to take effective action. Furthermore, the degree of ambition cannot be derived from the goals as the level of reduction may be achieved by structural change.

In sum, none of these measurements captures actual *environmental policies and implementing measures* of governments and their differences, but compares either *political intentions and ambitions* of governments or *changes in polluting activities and pollution levels* in a country irrespective of whether they can be attributed to policy or not. Against this background, we seek to develop indices that measures policy *outputs* in selected policy fields. Obviously, policy measures adopted may fail to achieve their objective, due to ineffectiveness or a lack of implementation. Thereby we have risks of measuring symbolic action only, very much alike the comparison of reduction goals. However, we argue that the measurement and comparison of instruments is a better proxy to capture concrete action. We compare a wide range of policies and measures that are hypothesized to be effective measures in the respective policy field. On this basis, one can reasonably assume that the policy output is likely to affect the behavior of targeted actors (rather than declaring a goal only) and, as a consequence, their environmental performance.

However, if we look at the examples of biodiversity policy and climate policy, there is no single policy instrument, that may serve as a "headline indicator" for the policy performance of a country. Unlike other environmental problems, greenhouse gases are emitted from a great number of different sources, sectors, and are result from a great number of different processes. Almost every societal sector and literally all individuals contribute to the problem, since its main cause, the use of energy resources, constitutes the basis of almost any human activity. Similarly, the protection of natural biodiversity, is not only a result of specialized environmental policies, but instead a requirement for several policy domains. To become effective, contributions are necessary from agriculture, housing, transport, water, forestry and other policy domains. Both policies for climate protection as well as for nature protection are in need for an effective integration in different policy domains.

Consequentially, effective biodiversity and climate policy have to rely on a portfolio of policy instruments and target a broad range of actors and sectors in national societies. For an adequate representation of policies it is therefore required to cover a great number of different policy areas that are relevant for reducing greenhouse gas emissions respectively for nature protection.

Furthermore, countries may have different preferences and traditions regarding their choice of policy instruments. While one country prefers economic instruments, another prefers command-and-control approaches. The different approaches may be functional equivalents and leading to the same results. It wouldn't be justified to score a country better just on the basis of the preferences for certain instruments.

Against this background, we seek to ensure that our policy output indices adequately capture the cross-national diversity of environmental policies in terms of targeted actors and selected policies and instruments. Last not least, the development of the policy output is limited by the availability of data. As we rely on secondary sources data on policies often is not available for every country and with different quality. Therefore, there is often no alternative to using second best indicators.

Policies to Protect Biodiversity

The protection of the natural heritage is a long standing challenge for governments. Beginning in the 19th century, governments have begun to protect fauna and flora in certain areas against the spreading of human settlements and other interventions to natural habitats. Human activities have a manifold influence on natural habitats: By emissions of pollutants, by using area for agriculture, settlements, roads or other infrastructure, by exploitation of natural resources e.g. water, wood, etc. or by hunting or fishing.

The effects of these activities are shrinking habitats for wildlife, contamination of habitats from pollutants, rapid changes of conditions, e.g. an increase in temperature caused by climate change or decreasing availability of water etc. As a result, many species have become extinct already today or their disappearance can be expected. The loss of biodiversity and the degradation of ecosystem services are seen by many observers as major threats.

A key instrument to protect biodiversity is the protection of land. Today, there are 100,000 protected areas, covering about 10% of the world's terrestrial surface (Stoll-Kleemann 2005). The limitation of certain human activities in designated areas is meant to provide the necessary reserves for fauna and flora. However, the designation of protected areas on its own has been not always effective to protect certain species. Furthermore, the prohibition of certain uses of areas is in conflict with other uses of the area or the affected resources. Depending on the size and the scope of the designated area, and depending on the possible alternatives for users to tap other resources, serious conflicts may arise and the implementation and effectiveness of the protection measures is put into question. Therefore, regulations and management plans are required to mediate between the conflicting interests or to enforce and monitor the protection measures (Stoll-Kleemann 2005).

Decision making and implementation of such measures has been for long solely in the responsibility of nation states or the regional and local levels of government. Since the adoption of the Convention on Biological Diversity (CBD), and the development of European legislation, the issue becomes increasingly subject matter of international and European policy development.

The protection of biodiversity and ecosystem services is subject of a number of non governmental organisations. These organisations, e.g. WWF, are important actors both on the national level as well as on the international level. The development of a non-state regime to protect forests is an archetype of a transnational regime (e.g. Pattberg 2005). IUCN is prominent international organisation that has both governments as well as non governmental organisations as members and it is highly influential in international negotiations and the implementation of protective measures.

However, despite of the highly differentiated and specialised policy area with its multilevel character, the multitude of actors and the variety of instruments and measures that evolved for nature protection, the challenge of nature protection is mainly an integration effort, as many other policy areas are setting relevant framework conditions for the effective protection of natural resources (e.g. Delbare 2006).

Relevant Policy Areas

The loss of biodiversity and eco-system services is caused by many different factors that are to a large degree not directly subject of policies for nature protection. Such factors can be partially categorised as structural factors of a country, e.g. the natural conditions, the population density or the structure of the economy, e.g. the degree of industrialisation. Although such issues may be subject of policy intervention as well, such factors change rather slowly and they can be seen as framework conditions of nature protection policies.

However other policy areas have a direct and often immediate impact on the effectiveness of nature protection, or the policies are even in latent conflict with protective policies. For example, in many countries, agricultural policies pursue the goal of protecting the economic interests of the sector and thereby focusing on supply oriented measures. The consideration of environmental concerns is an often acknowledged requirement, however, a policy change in this direction with for example a substantial promotion of organic food can be observed only recently and to a varying degree in the different countries (see e.g. Feindt 2007 (i.E.)).

The same holds for policies regarding forestry management. If forests are perceived mainly as a source for wood, it is likely that conflicts arise with policies to protect wildlife and biodiversity. The management of forests is a policy field on its own, with oftentimes well established policy networks. Again, only recently changes in policies occur in a number of countries often following the requirements of establishing forests strategies as outlined in Agenda 21 (Howlett/Rayner 2006). As part of the National Forests Plans typically Environmental NGOs are included, and more emphasis is placed on issues of sustainable development at least on the programmatic level.

Another important area are policies for water management. Again such policies can be directed towards a cheap supply of water, e.g. for irrigation, cooling or water as a mean of transport which both is likely to be in tension with more environmentally oriented water policies that focus on the preservation of a natural habitat.

In most countries, policies for housing and spatial planning take into account requirements of nature protection only to a minor degree. Areas for housing (and accordingly for transport) are growing at rapid pace. There are few countries that take effective action or have the goal of limiting the use of land. As there are strong economic interests related to land-use for housing, this remains a persistent environmental problems. However, governments begun to monitor land use and have set up programmes to limit sub-urbanisation and for the recovery of brownfields.

Finally, transport policies are highly relevant for preserving areas for wildlife. Oftentimes, transport policies are directed towards provision of cheap means of road transport. Policies are supply oriented and focused on the planning and building of motorways. Other modes of transport recently receive more attention. Many countries invest considerably in air transport and railways. The latter is seen as environmentally favourable, however, nature protection is not only a matter of the mode of transport, but there is also a need to leave sensitive areas uncut.

The brief discussion of policy areas that have a direct influence on the use of natural resources and in particular on land use reveals that nature protection is often in tension with supply oriented policies that give priority to the provision of cheap input factors for the economic development. Hence, effective nature protection is an integration task for governments. The requirements of the environment have to be taken into account in the different sectoral policies.

In the following we will discuss some indicators that reveal in how far governments are taking into account environmental concerns in the different policy areas as briefly sketched here. We will aggregate these indicators to a single index which shows the overall performance of countries in the field of nature protection.

Indicators for Protection of Nature and Biodiversity

To measure governments' efforts to protect biodiversity we select relevant and measurable policies in the relevant policy areas and collect data to measure the stringency of such policies. Data is collected for all OECD countries.

The first policy area is *nature conservation in the narrow sense*. Designation of conservation areas is the most important instrument in this area. We measure governments' ambition simply by the share of the country surface designated as protected area (WRI 2007). This indicator takes into count the history of nature conservation, too, as the designation of natural reserves dates back to the 19th century.

Furthermore, monitoring of biodiversity is an important basis to guide decisions relevant for nature conservation. To measure the extent of monitoring activities pursued by governments we rely on the self reporting of countries to the CBD. We extracted from the responses in the Third National Reports to the CBD the responses to selected questions (questions 19-23 on a scale from 1 to 3, of which we calculate the average).

Furthermore, the application of *Strategic Environmental Impact Assessments* (SEA) has evolved in many countries as an important instruments to integrate the requirements of nature protection into other sectoral plans. While most countries have implemented such instruments, countries vary considerably regarding their actual application. Some countries have gathered no experiences at all, some are doing pilot projects and others applying the instrument on a regular basis. To capture the level of stringency of impact assessments by country we count the implementation of SIA per year by country as reported from several sources (Fischer 2006, personal Communication Fischer 2007, Hilding-Rydevik 2003, OECD 2006, Dalal-Clayton/Sadler 2005, Bundesrat 2004) and derive an indicator on a scale from 1 to 3.

Thirdly, *international commitment* in the field of biodiversity protection is measured by voluntary contributions of countries to the CBD. The absolute contributions are weighted per capita.

Among the *sectoral policies* we measure the degree to which nature and biodiversity protection are considered in the agricultural sector, the forestry sector, the transport sector and spatial planning.

For the agricultural sector we rely on data derived from reporting to the CBD as in the case of monitoring. Our indicator for the sector comprises information on national strategic planning for agricultural biodiversity (question 161), programmes for the assessment of impacts of farming on biodiversity (164) and for the identification of suitable management practices and technologies (167), favourable policy environment (170), mainstreaming (171) and institutional frameworks (172). Single variables are measured on a scale from 1 to 4 and the overall indicator is calculated as the mean of all scores. Financial incentives play an important role for production decisions and indirectly nature protection in the agricultural sector since the agricultural sector is strongly subsidized, partly with environmentally adverse incentives (OECD 2005). Agri-environmental expenditures are substantial in certain countries (e.g. Austria spent more than 25% of all EU agricultural expenditures on agri-environmental measures, on average between 1992 and 2003 (Bailys et al. 2006). However, although indicator work by the OECD covers agri-environmental aspects (OECD 2001, 2007), there is no indicator available on expenditures for agri-environmental measures for the full OECD sample.

Efforts on nature conservation in the forestry sector are measured by the share of forest area with the designated function of protection and conservation as opposed to production or social services (and multiple purposes) (FAO 2005). To capture in how far biodiversity concerns are considered in production forests as well, we derive an additional indicator from the reporting of countries to the CBD again. It gives information on strategic planning for biodiversity, access and benefit sharing, addressing socio-economic distortions, public awareness, institutional enabling environment and assessment (questions 174 and 179-183). The variables are measured on a binary scale and the indicator is calculated as the sum of the scores for the six questions. From the two indicators the subindex on forestry is calculated as the mean of the ranks of countries.

Biodiversity concerns in the transport sector relate to the network of roads (and railways). We use the construction of highways as an indicator for adverse affects of transport policy on nature conservation (Eurostat 2007). Since we want to capture the recent government activity in this field we take into account the change in highway kilometres per person between 1995 and 2003 (EUROSTAT 2007; data available for EU countries only). However, this information alone discriminates against countries that have recently experienced strong economic growth and that start from a very thin network of infrastructure. Therefore, the number of highway kilometers in 2003 per person and per area is also taken into account. The indicator for transport policy is calculated as the product of the two variables.

Similarly, the strongest impacts on biodiversity from spatial planning relates to the land converted to artificial surfaces. While it is surely important where (in terms of ecosystems and biological diversity) conversion of land takes place, such information is not available for a large-n comparison. We therefore take the surface of a country converted to urban or industrial use (housing, services and recreation, and industrial & commercial sites (EEA 2007, available for EU countries only). As in the case of the road network this measure alone discriminates against countries that only recently experienced strong economic growth. The absolute share of land under urban and industrial use, according to the categories above, is thus also considered. The indicator for spatial planning policy is calculated as the product of the two variables.

To derive an overall index, we first calculate the rank of countries for each variable since the variables have different units and scales. The country with the strictest measure is labeled 1, the one with the loosest measure is on the last rank (16 or lower, depending on the number of countries for which data is available on a specific indicator). Non-introduction of a measure or non-reporting of data is thus not treated as if countries were doing nothing in biodiversity policy, but it is statistically treated as missing data. The overall index is calculated as the mean of the ranks for each policy area. For the current analysis with the purpose of comparing CPI and BioDivPI, we select from the overall sample of OECD countries and the full EU-25 sample only those countries which are covered in our climate policy index and with data availability for at least five of the 8 subindices in biodiversity policy.

We looked for data for these indicators for EU-27 and OECD countries. However, as we rely to a large degree on the self reporting of countries to the CBD, few countries that do not deliver such reports could not nbe taken into consideration (USA, Italy).

The results are shown in table 1.

Table 1: Biodiversity policy indices

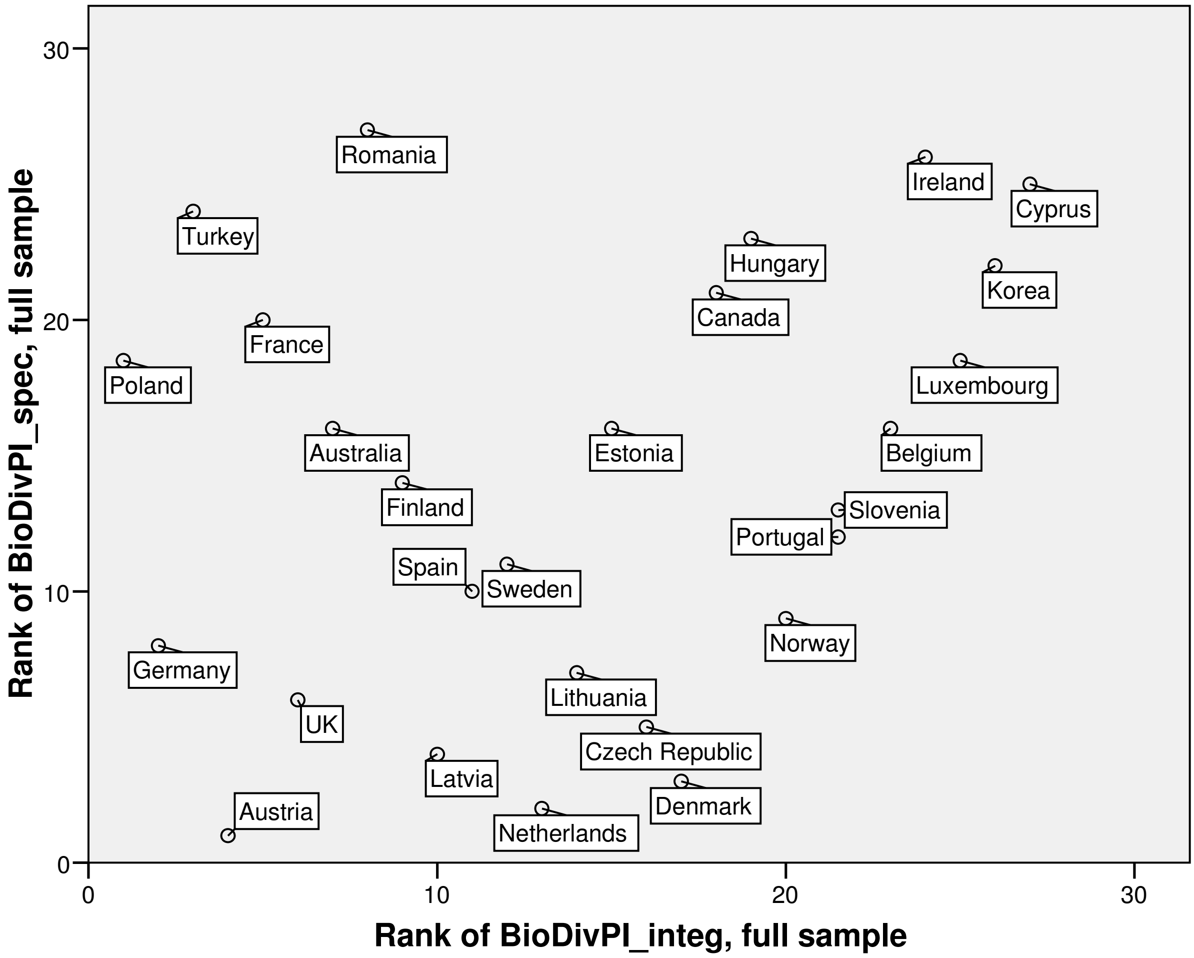
Country	Rank of BioDivPI	BioDivPI	Protected Areas	Monitoring	CBD Voluntary Contributions	EIA Implementation	Agriculture	Forstrey	Transport	Spatial Planning
Austria	1	6,3	2	2	8	12	3	5,5	10	8
Germany	2	8,0	1	15	12	4	2	8,3	6	16
UK	3	8,4	5	7,5	11	4	8	14,7	5	12
Latvia	4	8,8	10	2	.	12	23,5	11,7	1,5	1
Netherlands	5	9,0	3	7,5	2	4	8	11,8	17	19
Poland	6	9,0	6	23	.	4	8	13,3	4	5
Spain	7	10,4	15	.	6	12	.	8,5	14	7
Denmark	8	10,4	4	7,5	4	12	8	13,0	20	15
Lithuania	9	11,1	14	2	.	19,5	22	9,5	9	2
Sweden	10	11,2	12	15	5	4	12	18,2	12	.
France	11	11,3	24	15	9	4	4	13,5	7	14
Finland	12	11,4	17	20	3	4	1	19,7	15	.
Australia	13	11,4	13	7,5	20	12	5	11,0	.	.
Czech Republic	14	11,8	8	7,5	.	12	21	12,0	11	11
Norway	15	12,3	20	7,5	1	19,5	19,5	10,8	8	.
Turkey	16	12,6	25	15	.	.	12	8,0	3	.
Estonia	17	12,9	7	20	.	12	14,5	14,7	18	4
Portugal	18	13,6	21	7,5	7	19,5	8	12,0	21	13
Slovenia	19	14,2	11	15	.	19,5	17	12,0	22	3
Romania	20	14,6	26	23	.	.	23,5	7,7	1,5	6
Belgium	21	14,6	23	7,5	10	19,5	14,5	11,5	13	18
Hungary	22	15,4	16	23	.	19,5	17	7,5	16	9
Luxembourg	23	15,8	9	.	20	24	.	2,0	23	17
Canada	24	15,9	19	15	20	12	12	17,3	.	.
Ireland	25	18,4	27	20	20	12	19,5	19,8	19	10
Korea	26	18,7	22	15	20	24	17	14,2	.	.
Cyprus	27	22,8	18	25	.	24	.	22,8	24	.

Source: Own illustration

On the top ranks are Austria, Germany and UK. Already on rank four we find Latvia as a transition country. In general, we find transition countries scoring both very well and rather poor on the biodiversity index. The lowest three are Ireland, Korea and Cyprus. The difference in single country's ranks between subindices is quite remarkable for almost all countries.

Protection of biodiversity is largely an integration task as we argued above. To further assess in how far countries succeed in “greening” sector policies or if they have more specialized policies for nature protection, we calculate two additional indices. The first one measures the integration efforts: biodiversity considerations in agriculture, forestry, transport, spatial planning and all policy fields in the case of strategic environmental impact assessment. The second one takes into account the specialized biodiversity protection policies: protected areas, biodiversity monitoring and voluntary contributions to the CBD. The two indices are mapped against each other in figure 1. The two indices are not correlated significantly.

Figure 1: Biodiversity policy – integration efforts and specialized policies



Source: Own illustration

The difference in ranks between the specialized index and the integration index is marked for some transition countries, especially Poland, Turkey and Romania. This is partly a gratis effect of low level and dynamics of infrastructure development and urbanisation entering the integration index. However, we find such differences in Western European countries, too. While France and Germany rank comparatively better on the Integration index than on the specialized biodiversity conservation policy, the Netherlands, Denmark and Norway rank comparatively better with respect to the specialized biodiversity conservation policy than the integration tasks. It is worth noting, that countries such as Netherlands, Denmark, Norway, and Canada have been identified as pioneers in the introduction of instruments and strategies for policy integration (see Jacob/Volkery 2004, Jacob/Volkery 2007). However, this early and often encompassing introduction of such instruments and institutions like interdepartmental working groups, policy appraisals, strategies for sustainable development, etc. are not necessarily contributing to a good performance in the various policy areas. The UK appear to rank rather high on both sub-indices.

Comparing Policies for Nature Protection and Climate Change Policies

How do countries perform in other issue areas of environmental policy? We take an example from previous work on climate policies: Very much alike the policies for nature protection, there is no single indicator for the policy performance of a country. Unlike other environmental problems, greenhouse gases are emitted from a great number of different sources, sectors, and are result of a great number of different processes. Almost every societal sector and literally all individuals contribute to the problem, since its main cause, the use of energy resources, constitutes the basis of almost any human activity. Consequently, there is no single path to mitigate climate change, but an effective climate policy requires contributions from a broad range of actors and sectors in national societies.

We seek to ensure that an overall assessment of the climate policy adequately captures likely cross-national diversity of climate policies in terms of targeted actors and selected policies and instruments. Our Climate Policy Index (CPI) covers a broad range of market-based, information-based, regulatory, and monetary policies and instruments, namely tradable permits and taxes, labels, standards, subsidies, and expenditures for research and development. For a coverage of relevant policy areas, we included the policies to promote renewable energy, policies to promote energy efficiency, policies regarding energy use in industry, transport policies and policies to minimize energy use in households and buildings. Although this list is not meant to be conclusive as other policy areas may provide important contributions as well, these are the most relevant areas of action.

The policy measures selected to describe climate policy in the *industry* sector are energy taxes and the introduction of emission trading schemes. Not considered are voluntary agreements since they differ widely with respect to the role of government policies. However, UNFCCC (2003) states that, “historically, voluntary agreements have been the most frequently used instruments for industry”. To reflect the stringency of the selected policies by country, the tax rate on energy use in industry (namely heavy oil) (IEA 2006b) and the cap of emissions allocated to industry compared to the projected emissions is collected (Betz et al. 2006). To measure the pioneering behavior, the year of introduction of an energy tax is used as a proxy (collected by Busch/Jörgens 2005). In a strict sense, energy taxes apply not only to industry, but to energy use by households as well and they are driven by different motives, like shifting the tax base from labor to energy. The extent to which energy taxes affect emissions in industry depends largely on the coverage of industrial sectors, which is often heavily disputed (e.g. Kasa 2000).

Promotion of *renewable energy* has been an important field of (government) action to reduce CO2 intensity of energy supply. To capture the wide range of measures used to promote renewable energy, we consider in the index the introduction of investment incentives, voluntary agreements and tradable permits (IEA 2004), quotas and feed in tariffs (Busch/Jörgens 2005), as well as public expenditures on research and development (R&D) for the development of renewable energies. The level of stringency cannot be compared for all of these measures. For quotas and feed-in tariffs alone it is difficult to determine the level of support as the countries choose very different designs for their instruments (e.g. EC 2005).

The stringency of measures is therefore measured by the share of public R&D expenditures for renewable energy (IEA 2006).

Promotion of *energy efficiency* likewise is an important field of climate policy. We measure it simply by the share of public R&D expenditures for energy efficiency (IEA 2006). Energy efficiency is a central topic of many of the measures targeted at different uses of energy, like household appliances, buildings, industry or vehicles which we consider as separate fields of action.

Climate policy in the *households* sector targets energy use for household appliances and heating. Mandatory labels and mandatory minimum standards for consumer appliances are widely used instruments towards energy efficiency in households. In addition, energy taxation for households gives a price incentive for energy saving. We deduct the pioneering behavior of countries from the year of introduction of mandatory labels and standards for ten household appliances: refrigerators, freezers, dishwashers, clothes washers, clothes dryers, electrical ovens, lamps, air-conditioners, water heaters, and boilers (own collection). The level of stringency is derived from the tax rate for oil for households (IEA 2006b).

The *transport* sector is the most rapidly growing emission source in Annex I countries, with increases of about 20% in the year 2000 relative to the year 1990 (Simeonova/Diaz-Bone 2005). This can clearly be seen as a failure of climate policy in the transport sector which has not yet properly addressed ever increasing transport volume. Fuel and other transport-related taxes have been widely used and provide more than 90 per cent of all environmentally related tax revenues in OECD countries (UNFCCC 2003). Yet their effect on fuel consumption is reported to be only moderate (ibid). We derive the level of stringency of transport policies from the tax rate on fuel (premium unleaded, if missing, regular unleaded fuel) and diesel (IEA 2006b). Other measures in the transport sector not considered in the index aim at improving vehicle efficiency; reducing carbon intensity of the fuel mix; moderating growth of transport activities and shifts towards less polluting transport modes and improving traffic flow and spatial planning (UNFCCC 2003; for a comparison of emission and efficiency standards for cars compare Pew Center on Global Climate Change (2004)).

Finally, the *buildings* sector is an important field of action in climate policy and has large potential for energy savings. To reduce energy demand of new buildings, mandatory regulations for energy efficiency are widely used and proved to be an effective policy in the residential sector (UNFCCC 2003). To describe the stringency of thermal insulation standards a ranking of countries was constructed based on calculations by EC (2001) who compare energy use of buildings according to existing regulations with the rather strict Danish standards correcting for climatic conditions. Countries not covered in this calculation are ranked according to their position between countries reported in WEC (2001), Eichhammer and Schlomann (1998) and Visier et al. (2002). Information on climate policy for buildings in our index is thus only reported for one period of time as of about 2000.

In summary, we have a certain bias in our selection of indicators towards monetary instruments, especially taxes and R&D expenditures. Therefore, countries that have preferences for such instruments in their policy portfolio, like for example, Italy, score better than countries that do not have high energy taxes, like the US.

The overall index is constructed by the same principle as the Biodiversity policy index, by first determining the rank of each country on a subindex by sector, and finally averaging the ranks for the overall index. The sectoral subindices and the overall index is more complex than the BioDivPI as the CPI comprises information not only on the stringency of a measure, but also on the pioneering role of a country (compare Künkel et al. 2007).

Results of the ranking are shown in table 2.

Table 2: Climate policy indices

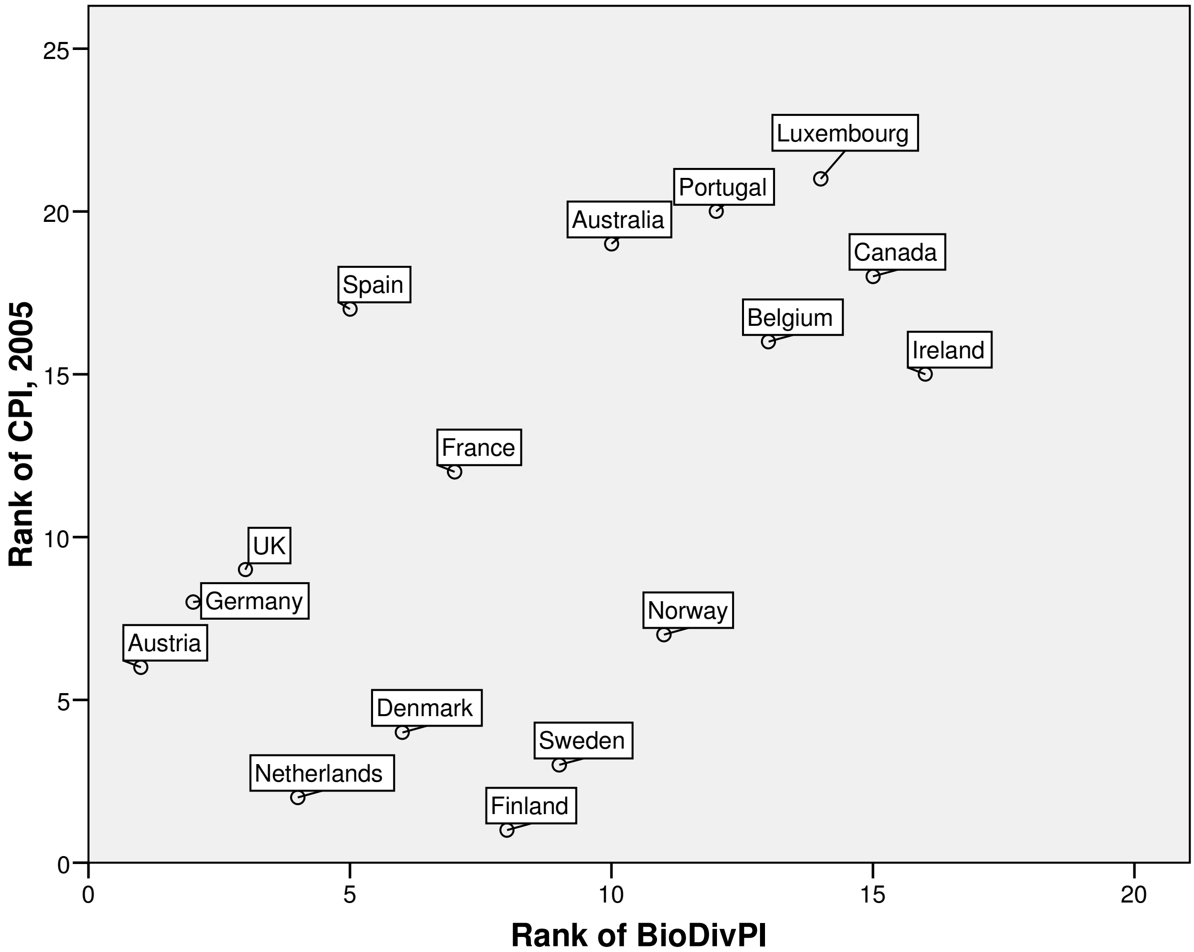
Country	Rank CPI	CPI	Industry_comp	RenEn_comp	EnEff_comp	HH_comp	Transp_comp	Buildings_comp
Sweden	1	4,7	2	10	4	2	9	1
Netherlands	2	4,8	6	4	3	4	5	6,5
Denmark	3	5,1	9	2	10	1	6	2,5
Finland	4	6,1	3	3	2	14	8	6,5
Italy	5	8,3	7	6	11	3	7	15,5
Norway	6	8,3	1	22	16	5	3	2,5
Austria	7	8,8	4	8	8	8	14	11
Germany	8	9,8	13	5	18	17	2	4
Japan	9	11,3	8	7	1	20	18	14
Switzerland	10	11,3	19	1	5	21	11	11
UK	11	11,3	5	12	21	18	1	11
Australia	12	12,0		11	12	6	19	
France	13	12,0	16	18	15	11	4	8
Greece	14	12,8	11	14	17	7	17	11
Ireland	15	13,0	14	19	6	16	12	11
Canada	16	13,3		13	7	12	21	
Belgium	17	14,6	10	17	13	22	10	15,5
USA	18	14,6	18	9	9	15	22	
Spain	19	14,7	12	15	19	10	15	17
New Zealand	20	14,8		16	14	9	20	
Luxembourg	21	15,4	17	20		19	16	5
Portugal	22	16,7	15	21	20	13	13	18

Source: Own illustration

On the CPI, the Nordic countries Sweden, Denmark, Finland and Norway as well as the Netherlands are among the top six countries. On the last five ranks we find the US, New Zealand and Luxemburg, Spain and Portugal. Sectoral preferences of countries do exist, but countries ranking top are rather ambitious in most sectors.

How does the performance in climate protection policies compare against policies to protect nature and biodiversity? Mapping BioDivPI against CPI (figure 2) reveals a certain degree of accordance between the two indicators.

Figure 2: Biodiversity and climate policies



Source: Own illustration

The correlation between the two indicators is 0.56 and significant at the 0.01 level. However, the sample for which both indicators are available is only n=16. Several countries often perceived as environmental pioneers (Andersen/Liefferink 1997, Jänicke 2005), i.e. Austria, Netherlands, Germany, UK, Denmark, Finland and Sweden are found among the top 10 ranks in both policy fields. Likewise a clear “laggard”, on a rank below 20, in both policy fields is Luxembourg. Those countries that are above the diagonal of the box in figure 1 perform comparatively better – relative to the respective sample that is - in biodiversity protection than in climate policy according to our measurements. The deviation is particularly strong for Spain (performing poorly on the CPI, but relatively well on the BioDivPI). The difference is also noteworthy for the whole group of Nordic countries, Sweden, Denmark, Finland and Norway, which perform particularly well on the CPI and not quite as well on the BioDivPI.

When looking at correlations between subindices, we do find a medium, significant correlation between the respective “transport subindex” of the CPI and the BioDivPI: Climate repsonsible transport policies go, on average, in hand with more biodiversity friendly transport policy. For all other subindices no direct match, and no correlations, can be found.

Are Capacities for Environmental Policies Issue dependent?

How can we explain the scores in the two policy fields? What characterizes a country's success in a policy field like climate policy or biodiversity protection? The variation between the two indicators leaves room to explore issue specific capacities as well as more general (environmental) policy capacities. For a closer analysis of the variance in policy performance across countries we draw on the concept of environmental policy capacity developed by Jänicke (1997). He distinguishes between "capacity, as a relative stable condition of action, and its utilisation which leads to the subjective and situative aspect of environmental policy". The environmental capacity of a country, in this perspective, is constituted by the strength, competence and configuration of the governmental and non-governmental proponents of environmental protection and the specific cognitive-informational, political-institutional and economic-technological framework conditions.

In previous contributions, we discussed the opportunities and difficulties in further operationalisation of the conceptual model (Jacob/Volkery 2006, Künkel/Jacob/Busch 2006, Künkel/Jacob/Volkery 2006). For our purposes, we reviewed and collected indicators in regards of four different issue areas (problem pressure, political system, strength of actors and supportive factors). As far as applicable, we apply indicators related to the two different issue areas to increase the explanatory power.

1) Problem pressure

On the one hand, someone can expect environmental problems, e.g. emission rates, pollution and environmental deterioration a source of legitimisation of environmental policies. The higher the environmental pressure of a country, the more advanced and ambitious the environmental policy could be a functional hypothesis. However, on the other hand, the use of the environment is most often related to economic interests, therefore, limiting the use of natural resources, is likely to cause opposition (and disputes within governments) and hence limiting the possibilities for effective interventions. We explore the relationship for climate policies using the indicators of CO_2 per capita and CO_2 per GDP (IEA 2006b). For the analysis of problem pressure in nature protection, we use the indicators of area under artificial surface and population density. Moreover, we test the relation with the overall environmental performance as measured in the "Environmental Sustainability Index" (Esty et al. 2005).

2) Openness of the political system for political change

We are in particular interested in the number of institutional veto-players involved since a large number of veto-players increases the difficulty of departing from the status-quo and thus ambitious environmental policy. Furthermore, it is of interest how new and emerging issues find their way into the political decision making process. Political systems vary considerably regarding their openness to change and to include new actors. For these aspects we analyse in how far variables like the degree of corporatism, federalism, and the difficultness of new parties entering parliament (as measured by the effective number of parties and the electoral treshold) (drawing on the work of Lijphart 1999). The political system is the same for policies to protect biodiversity as well as for climate change policies. However, it is a question open to investigation if certain aspects have greater importance for the one or the other aspect, e.g. if the degree of federalism is more important in the nature protection or if corporatism plays a greater role for the performance in climate policies.

3) Relative strength of organised actors.

The openness of a political system for change is not limited to environmental interests only. Instead, we expect the strengths of actors to be important as well. We distinguish between potential proponents of ambitious environmental policies and polluters which may limit or inhibit environmental policies. Among political parties it wouldn't be sufficient to simply count the number of green voters or the strength of green parties as this is dependent on the electoral system. "Green" ideas might be taken up by other parties as well. Benoit and Laver (2005) offer an index measuring the environmental position of parties. We use the score of the "greenest" position in parliament, and the weighted score of all parties' environmental position. Regarding NGOs we take into account the strength of environmental groups as measured by the membership rate in environmental groups (Scruggs 2003). Regarding the biodiversity policies we also take into account the number of IUCN Member organisations in a country (Esty et al. 2005). Green economic actors are represented by the number of ISO 14001 certified firms (both issue areas) and the size of FSC certified area (biodiversity) and the share of renewables in energy supply (climate policies). The opponents of climate and biodiversity policies are represented by the strength of the economic sectors that are polluters. In the case of biodiversity policy we use value added in agriculture per ha of land area (Worldbank 2006) as an indicator for (intensive) agriculture and the share of land area converted to artifical uses as an indicator for urbanization. In climate policy it is the "dirties", sectors consuming large amounts of fossil energy, that we measure by the share of these sectors in GDP (Binder 2001).

4) Supportive factors

A fourth group of variables is concerned with the framework conditions of environmental policy making. These factors are covered firstly by economic conditions, i.e. economic growth and GDP per capita (Worldbank 2006). Furthermore, we analyse in how far a public support for environmental policies is an enabling factor for ambitious environmental policies. As with the variables on the political system, we do not distinguish between the two issue areas.

We empirically test these relations by means of correlation analysis. To eliminate effects of the chosen sample, we recalculate the correlations for a reduced sample of only n=16 for which we have data for both policy fields. Especially this small sample size requires care in the interpretation of all results. For each of the variables we perform a bivariate analysis to explore the significance of their contribution to explain the policy performance in both issue areas. The results are shown in table 3.

Table 2: Climate policy indices

	Biodiversity Policy	BioDiv PI	Climate Policy	CPI	General
Problem pressure	Area under articifal surface[a],	0.237	CO_2/cap	0.245	
	Population density	-0.248	CO_2/GDP	0.672**	
		0.051		-0.489	ESI
Political System		-0.274		-0.716**	Corporatism
		0.161		0.594**	Electoral Treshold
		0.125		-0.444	No. of Parties
		-0.106		0.128	Federalism
Actors: Polluters	Agric. VA/ha,	-0.245	Dirties in Industry	0.568	
	Land take	0.131			
Actors: Proponents of environmental concerncs	IUCN Member Organisations,	0.153	Renewables in Energy supply	-0.470	
	FSC ha/surface	-0.002			
		-0.269		-0.552**	ISO 14001
		-0.046		-0.612**	Env. Groups
		-0.571**		0.156	Greenest Env. Party Position
		0.215		-0.046	Env. Position weighted
Supportive factors		0.368		0.183	GDP pc
		0.600**		0.298	Growth (93-03)
		-0.184		0.254	Public Support

Source: Own calculation

The two indices are measured as ranks, implying a low rank for good performance in policy. Negative correlations are therefore indications of a positive relation between two concepts. In principle all significant correlations carry the expected signs.

Starting with climate policy, we find empricial support for most of our hypotheses: Actors have an influence on climate policy: A higher share of "Dirties" in industry impedes climate policy, albeit this correlation is not significant in this sample, it yet is a substantial, medium correlation. The strength of proponents (the share of renewables in energy supply, the share of ISO 14001 certified firms, and the strength of Environmental Groups), on the other hands, is positively related to climate policy as found by a significant, medium correlation. Corporatism is clearly associated with a better rank in climate policy, as is the openness of the political system, yet statistically not as clearly. As in previous work on climate policy, we do not find evidence for an impact of federalism on climate policy. Neither do we find a significant correlation with parliament parties' environmental position. The variable we chose to operationalize problem pressure – CO_2/GDP – is inversely related to climate policy. It is not higher emissions that lead to more ambitious climate policy, but rather vice versa.

Looking at biodiversity policy, we find little support for our hypotheses and only few significant correlations. Although we operationalize the concept of environmental policy capacity and its single components – actors, policitical system, problem pressure, supportive conditions – with respect to the policy field, we only find support for a clear relation between biodiversity policy and GDP growth, which we find to be inverse: The higher the growth of GDP the poorer the performance in biodiversity policy. In the course of economic development, unless it is clearly sustainable development, there seems to be little room for nature protection. Moreover, in our sample, we do find a "partisan effect": A strong environmental position of at least one party in parliament is associated with better biodiversity policy. A similar relation was found for the share of left parties in parliament. We regard this finding as prelimary and will subject it to further analysis in an extended sample. None of the variables describing actors, the political system or problem pressure are found to be significantly related with biodiversity policy. The aggregate index on environmental governance (Esty et al. 2005) is significantly correlated with BiodivPI: The hihger the score on the the better the score on the biodiversity policy index. This is an interesting finding since its single components are mostly not significantly correlated with the BioDivPI. It points to the need for further analysis of the correlates and causes of Biodiversity policy, including multivariate analysis.

In sum, while we are fairly well able to explain climate policy, biodiversity policy largely leaves us with a puzzle with respect to its explanatory factors.

Future Research

To be discussed on the conference…

References

Andersen, Mikael Skou/Duncan Liefferink, 1997: European environmental policy : the pioneers, Issues in environmental politics. Manchester: Manchester University Press.

Bailys, K., Peplow, S., Rausser, G., Simon, L., 2006: Agri-environmental Policy in the European Union: Who is in charge? CATPRN Paper.

Betz, Regina, Rogge, Karoline and Joachim Schleich (2006): EU emissions trading: an early analysis of national allocation plans for 2008–2012, Climate Policy 6: 361–394

Binder, Manfred, and Kerstin Tews. 2004. Goal Formulation and Goal Achievement in National Climate Change Policies in Annex-I Countries, ffu report 02-2004. Berlin: Freie Universität Berlin, Environmental Policy Resarch Institute.

Bundesrat. 2004. Bericht des Bundesrates über den Vollzug der Umweltverträglichkeitsprüfung (UVP) und die Bewilligungsverfahren. Bern: Bundesrat (CH).

Busch, Per-Olof/Helge Jörgens, 2005: Globale Ausbreitungsmuster umweltpolitischer Institutionen, in: K. Tews/M. Jänicke (Hrsg.), Die Diffusion umweltpolitischer Innovationen im internationalen System. Wiesbaden: VS Verlag, 55-193.

Dalal-Clayton, Barry/Barry Sadler, 2005: Strategic Environmental Assessment: A Sourcebook and Reference Guide to International Experience. London and Sterling: Earthscan.

Delbare, Ben, 2006, European Policy Review – assessing policy impacts on biodiversity, Nature Conservation 12: 129-130.

Eichhammer, Wolfgang, and Barbara Schlomann. 1998. A comparison of thermal insulation regulations in the European Union. Karlsruhe: Fraunhofer Institute for Systems and Innovations Research.

Esty, Daniel C., Marc A. Levy, Tanja Srebotnjak, Alexander de Sherbinin, Christine H. Kim, and Bridget Anderson. 2006. Pilot 2006 Environmental Performance Index. New Haven: Yale Center for Environmental Law & Policy.

Esty, Daniel C., Marc A. Levy, Tanja Srebotnjak, and Alexander de Sherbinin. 2005. 2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship New Haven: Yale Center for Environmental Law & Policy.

European Commission (2005): The support of electricity from renewable energy sources, Communication from the Commission, COM(2005) 627 final (Kasa) Brussels

European Environment Agency (2007): Corine land cover statistics 1990 - 2000 by country, Copenhagen, online: http://dataservice.eea.europa.eu/atlas/viewdata/viewpub.asp?id=1354.

FAO, 2005: Global Forest Resources Assessment, Rome: Food and Agriculture Organization.

Feindt, Peter H., 2007 (i.E.): Integration von Umweltbelangen in die europäische Agrarpolitik. Institutionelle Bedingungen und Politik-Lernen im Mehrebenensystem, in: K. Jacob/P. O. Busch/F. Biermann/P. H. Feindt (Hrsg.), Politik und Umwelt. PVS Sonderheft. Wiesbaden: VS Verlag.

Fischer, Thomas B., 2006: SEA in spatial/land use planning in the 25. EU member states – a July 2006 update, in: UVP Report 20, 127-131.

Germanwatch, 2006: Climate Change Performance Index 2007. A comparison of the 56 top CO2 emitting nations, in: http://www.germanwatch.org/klima/ksi.htm, 11 November 2006.

Hilding-Rydevik, Tuija. 2003. Environmental Assessment of Plans and Programs Nordic experiences in relation to the implementation of the EU directive 2001/42/EC. Stockholm: Nordregio.

Howlett, Michael/Jeremy Rayner, 2006: Globalization and Governance Capacity: Explaining Divergence in National Forest Programs as Instances of "Next-Generation" Regulation in Canada and Europe, in: Governance: An International Journal of Policy and Administration 19, 251-275.

IEA. 2004. Renewable energy. Market and policy trends in IEA countries. Paris: International Energy Agency.

IEA. 2006. Energy prices and taxes 2006, edited by I. E. Ageny. Paris.

Jacob, Klaus/Axel Volkery, 2004: Institutions and Instruments for Government Self-Regulation: Environmental Policy Integration in a Cross-Country Perspective., in: Journal of Comparative Policy Analysis: Research and Practice 6, 291-309.

Jacob, Klaus/Axel Volkery, 2006: Modelling Capacities for Environmental Policy-Making in Global Environmental Politics, in: M. Jänicke/K. Jacob (Hrsg.), Environmental Governance in Global Perspective. New Approaches to Ecological Modernisation. Berlin: Freie Universität Berlin, 67-94.

Jacob, Klaus/Axel Volkery, 2007: Umweltpolitikintegration und Selbstregulierung. Ein Vergleich von Instrumenten zur Umweltpolitikintegration in den OECD Ländern, in: K. Jacob/F. Biermann/P. O. Busch/P. H. Feindt (Hrsg.), Politik und Umwelt. Wiesbaden: VS-Verlag.

Jänicke, Martin, 2005: Trend-setters in environmental policy: the character and role of pioneer countries, in: European Environment 15, 129-142.

Kasa, Sjur 2000: Explaining emission tax exemptions for heavy industries: A comparison of Norway, Denmark and the Netherlands. CICERO Policy Note. Oslo, Center for International Climate and Environmental Research.

Künkel, Nana/Klaus Jacob/Axel Volkery, 2006: Institutional capacities and environmental policy performance in industrialized and developing countries – different or all the same? Paper read at Annual meeting of the International Studies Association March 22-25, 2006, San Diego.

Künkel, Nana/Klaus Jacob/Per Olof Busch, 2006: Climate policies: (the feasibility of) a statistical analysis of their determinants. Paper read at 2006 Berlin Conference on the Human Dimensions of Global Environmental Change. Resource Policies: Effectiveness, Efficiency and Equity. Dec 17-18 2006, at Berlin.

Lijphart, Arend, 1999: Patterns of democracy. Government Forms and Performance in Thirty Six Countries. New Haven: Yale University Press.

OECD, 2001: Environmental Indicators for Agriculture. Methods and Results Volume 3. Paris: Organization for Economic Development and Cooperation.

OECD, 2005: Environmentally Harmful Subsidies. Challenges for Reform. Paris: Organization for Economic Development and Cooperation.

OECD, 2006: Environmental Performance Reviews: Korea (2006). Paris: OECD.

Pattberg, Philipp, 2005: The Forest Stewardship Council: Risk and Potential of Private Forest Governance, in: Journal of Environment & Development 14, 356-374.

Pattberg, Philipp, 2005: What Role for Private Rule-Making in Global Environmental Governance? Analysing the Forest Stewardship Council (FSC), in: International Environmental Agreements: Politics, Law and Economics 5, 175-189.

Pew Center on Global Climate Change (2004): Comparison of Passenger Vehicle Fuel and Greenhouse Gas Emission Standards Around the World, Arlington: Pew Center on Global Climate Change, www. Pewclimate.org.

Scruggs, Lyle A. 2003. Sustaining abundance: environmental performance in industrial democracies. Cambridge, Mass.: Cambridge University Press.

Simeonova, Katia, and Harald Diaz-Bone. 2005. Interated climate-change strategies of industrialized countries. Energy 30 (?):2537-2557.

Stoll-Kleemann, Susanne, 2005: Voices for Biodiversity Management in the 21st century, in: Environment 47, 24-36.

Visier, Jean Christophe, Kirsten Engelund Thomsen, and Gudni Johanssen. 2003. Energy performance of buildings. Calculation procedures used in European countries. Vienna: Austrian Energy Agency.

WEC. 2001. Energy Efficiency Policies and indicators. In WEC Report 2001. London: World Energy Council.

Worldbank 2006. World Development Indicators, Washington.