

The state as a tillerman - getting back-in or getting squeezed out. Two contrasting cases in the field of flood protection in Germany

Paper submitted to the International Conference
"Governance for Sustainable Development"

Berlin, February 5-7th

Draft, please do not cite.

Hellmuth Lange¹, Heiko Garrelts²

artec | Research Center for Sustainability studies / University of Bremen

1	INTRODUCTION	2
2	DISCOURSES AND THE POLICY-SCIENCE INTERFACE	4
2.1	Science providing uncertain knowledge	4
2.1.1	Transferring scientific findings (Transfer model)	6
2.1.2	Transforming scientific findings (Transaction model)	7
2.2	Boundary work and discourses	8
3	TWO CASES: ABOUT SCIENTIFIC-ADMINISTRATIVE HYBRIDS AND POLICY CHANGE	9
3.1	The problem of flooding	9
3.2	Coastal protection on the German North Sea Coast between safety and risk.....	10
3.3	How to manage the risk of severe floods in river basins?	13
4	DISCUSSION	17
5	CONCLUSIONS	19
6	REFERENCES	21

¹ lange@artec.uni-bremen.de

² garrelts@artec.uni-bremen.de

1 Introduction

Due to its risk- and disaster potential climate variation can increase the vulnerability of society. Thus, societies have to pursue strategies encompassing mitigation as well as adaptation and response. Vulnerability to climate variation is, in part, determined by the politically adopted strategies in force so far. Flood protection is one of the fields where to cope with the problem to seize or to miss the respective chance. According to Paavola and Adger (2004, p. 175) adaptive responses include changes in institutional arrangements or public policies, public and private spending as well as investments in infrastructure and other durable goods. However, experience also shows that there are constraints to achieving full adaptation. Maladaptation can occur due to decisions based on short-term considerations, imperfect foresight, insufficient information, and over-reliance on insurance mechanisms (IPCC 2001, 8). Another crucial aspect of adaptation is the generation, dissemination and consideration of climate-related knowledge.

With regard to the latter point, the actors inevitably run into a dilemma: Scientific research on climate change is providing an ever growing amount of knowledge. But being based on models and notorious insufficient data, scientific expertise is bound to uncertainty. Thus, the extend, the date of occurrence and the frequency of extreme climatic events can only be foreseen in a rather vague and fuzzy way. Furthermore, scientific scenarios and prognoses are even disputed within the scientific community. Politicians and administrative officers, however, are obviously strongly interested in building their decisions on the most reliable knowledge available.

This raises the question: What is and what can be the place of science within the context of political and administrative decision making? In this paper we discuss whether knowledge can play and if so, how it can play a role in decision making processes. Which actors refer to what kind of climate-related knowledge? Under which circumstances can new knowledge "diffuse" in policy, which in turn has to give public account of the risks of climate variation but the uncertainties of prognosis. The occurrence of what we later will call "risk discourse" – in opposition to a "safety discourse" – will be our explanatory variable.

Discussing the science-policy interface we refer to the debate on blurring boundaries between science and policy making: In earlier models science was seen as delivering instrumental knowledge to policy makers providing a sound basis for the most adequate political decisions. Based on empirical findings, mainly in the field of

Science and Technology Studies, this kind of optimistic (and technocratic) understanding has largely been questioned and, in parts, been replaced by a more sceptical and constructivist understanding (Jasanoff et al. 1995; Bonß 2004; Opielka 2005). In fact, science is evermore influencing political decision-making but also science is getting increasingly politicised. But blurred boundaries do not imply that the two systems, science and policy, are becoming congruent. Due to different logics boundaries remain. As a consequence, their interaction has to be identified empirically.

In this article we discuss two cases. The first one refers to coastal protection in Northern Germany (www.krim.uni-bremen.de). Within an empirical research project we asked to what degree the scientific debate on climate change has led to new forms and results of assessing the necessary dimensions of dykes and further protective buildings. In this case the administrative officers in charge of coastal protection proved to be the key actors whereas politicians just followed and consented administrative input. Administrative officers could play this role due to their specific capacities to reshape uncertainty so as to match better with the ways of political and administrative decision making. They developed a “scientific-administrative hybrid”.

The other case study refers to the question how the political and administrative authorities are coping with the risk of more frequent and more intense flood events in river basins (www.innig.uni-bremen.de). This project refers to the severe floods in Germany in 2002 and the subsequent policy change towards a more risk oriented strategy, which was more in line with the emphasis on uncertainty in the ongoing scientific debate on climate change. Here, no hybrid came about. The change clearly resulted from decisions taken on the political level while the administrations in charge have been expected to just accept and implement it.

The focus of both projects is on knowledge transformation and policy change. Whereas the second case lead to policy change the first one did not. Why did the first case lead to developing a scientific-administrative hybrid while the second case did not?

The proceeding is as follows: First we give a brief overview on the complementary tendencies of science getting politicised and politics getting increasingly influenced by and being increasingly dependent on science (section 2). Then the two cases will

be presented (section 3). The findings will be discussed within the framework of the policy windows approach (section 4). Some conclusions will be drawn in section 5.

2 Discourses and the policy-science interface

In a functionally differentiated society policy and science are systems among others. They run on different logics. The logic of the political-administrative system follows the mediation of interests by institutionalising power in law. Science has to insist on truth as a code or a value (Opielka 2005). While science aims at elaborating explanations the political-administrative system is centred on political decision making, on developing subsequent concepts. Political and administrative coordination of action is being organized in a more or less vertical setting whereas science is being organized in a more horizontal and less integrated way.

But since quite some time the two systems are less remote from another than it may appear in a radical view of system theory. Weingart describes how science, since the early 19th century, is continuously losing its former social isolation (Weingart 2001, pp. 14-15 + 25). As a consequence, interdependencies and couplings are increasing. Thus, the distance between science and the public is shrinking. In 1966, Robert E. Lane, for the first time, dealt on the "knowledgeable society": Social actors rely increasingly on scientific knowledge, they expend parts of their resources for scientific research and they use scientific knowledge in an instrumental manner as to realize their goals (Lane 1966, p. 650). Stehr (1994) mentions further aspects: the diffusion of science into all spheres of life, the replacement of other forms of knowledge, the development of knowledge production as a new sector and the changes in power relations (Stehr 1994, p. 36f).

Because of these tendencies we go more in detail and describe the transfer model (2.2) and the transaction model (2.3) as possible science-policy-interfaces. But before, we turn to the introductory mentioned aspect of science and uncertainty (2.1).

2.1 Science providing uncertain knowledge

Beck coined the term "reflexive policy" (1986, 1993, 1996). At first hand, it aims at unexpected consequences of precedent political decisions, intended to constantly "modernizing" society in order to ensure a more comfortable life for an ever-growing number of citizens. But as a consequence, policy making has to cope with an increasing number of more or less unexpected and unwanted side effects and is thus forced to become reflexive. How far is this relevant for knowledge policy too?

Whereas, in the past scientific findings were seen as a "delivery" to policy makers science, today it is commonly held that scientific findings are temporary and fragmentary. Moreover, systematically produced knowledge does not only generate more knowledge but also more ignorance. Against the catchword "knowledge society" other catchwords, like "risk" and "uncertainty", are positioned. Brian Wynne (1992) has developed an approach to conceptualise these different forms of not-knowing, "overlaid one on the other", depending on the breadth of "social commitments ('decision stakes') which are bed on the knowledge being correct" (Wynne 1992, p. 116, in Boudourides 2003, p. 8). Wynne's taxonomy is an attempt to make some key distinctions on the following seven categories of uncertainty:

- *Risk*: system behaviour is basically known and chances of different outcomes can be quantified probabilistically.
- *Uncertainty*: important system parameters are known but not the probability distributions.
- *Ignorance*: knowledge about the system and likelihoods of its outcomes escape recognition – "we don't know what we don't know".
- *Indeterminacy*: issue, conditions and causal chains are all open-ended on how intermediate actors will behave" in non-determinate behavioural processes.
- *Complexity*: open behavioural systems and emergent, multiplex, 'non-linear' and irreducible processes.
- *Disagreement*: divergence over observation, framing and interpretation of issues.
- *Ambiguity*: contested or unclear meanings of the issues and, hence, of the process key-elements.

Schiller and Tänzler (2004, p. 185 and Schiller 2005, pp. 46ff.) suggest to speak of risk, uncertainty, specified ignorance and unspecified ignorance. Specified and unspecified ignorance point to epistemological aspects of uncertainty while uncertainty itself is defined through the lack of prognostic power in open systems while probabilistic values allow to speak of risk (Schiller/Tänzler 2004, p. 184).

Uncertainty touches on the authority of the natural sciences. It is pretty contrary to the expectations of policy makers and to public expectations with respect to science. The increasing reference to science seems to be accompanied by its de-

ing credibility. Paradoxically, science is a scarce resource, in spite of its exponential growth. When debates are framed in scientific terms, each confrontation may undermine the credibility of the positions and lead to the search for more scientific weapons. Expertise generates counter expertise (Benveniste 1977, p. 147), particularly in pluralistic societies.

Weingart (2001, p. 20) concludes: "Linking the knowledge-production to decisions in political contexts gives brisance to the problem of ignorance. Scientification of policy loses its primary rationalistic sense." How do policy maker deal with this fact?

2.1.1 Transferring scientific findings (Transfer model)

The idea of using scientific knowledge in the sense of their just *application* by making policy makers applying it and the related idea of a clear cut *separation* of science and policy is influential till today. It originated in the scientific and technocratic optimism in the field of *policy advising* and science based political planning (Nullmeier 1993; Weingart 2001, 12; Bonß 2004). Recent demands for science to provide knowledge that is actively effective in different areas of society are generally made in the context of key (controversial) challenges (Hirsch-Hadorn et al. 2004, p. 285). Analysing the scientific input for politics and discussing the science-policy-interface, Norse and Tschirley (2000) adopt the classical policy-cycle as the starting point³. They explain the involvement and role of science like this: Science provides an inventory of knowledge dealing with the relevant issue and quantifies data for the purpose of problem identification. Based on this strategies are then formulated. The next phase involves a selection of possible policy options that promise to exert a quantitatively relevant influence on the issue at stake. This is followed by the modelling of possible policy implementations, involving physical and economic models. Finally, science also provides the network needed for the monitoring and evaluation of the policy measures (Hirsch-Hadorn 2004, p. 286).

The theoretical background is the idea of knowledge facing policy and the idea of being able to separate facts and values, scientific input and policy process from each other (Nullmeier 1993, p. 177). Scientific knowledge, in this perspective, is just one factor in policy analysis, additional to interests, identities or institutions (Braun/Busch 1999; Scharpf 2000).

³ Their work is based on their experience in the context of the FAO and refers to the global nitrogen cycle.

2.1.2 Transforming scientific findings (Transaction model)

According to Nullmeier (1993, p. 177) the notion of externally produced knowledge neglects the capacity of policy actors to produce their own knowledge, to develop their own frames of interpretation and specific 'cognitive representations'. Additionally, the natural scientific production of knowledge is always located within (social) contexts (Bonß et al. 1993, p. 32, in Schiller/Tänzler 2004, p. 184).

This has become clear on the occasion of scientific actors. For quite some time now science has developed or at least has presented its results referring more or less directly to their political relevance. Turning, by doing so, into political actors scientists break with traditional "scientific ideals" like the separation of facts and values. Political engagement and even emotions are not longer a taboo. Instructive examples within natural science and environmental policy are the debates and the research respectively dealing with biodiversity (Eser 2001 + 2003, Görg 2003, Potthast 1999, Takacs 1996), with the ozone layer (Grundmann 1999) and with climate change being of particular interest here (Weingart/Engels/Pansegrau 2002; Viehöfer 1997 + 2004). Thus, "epistemic communities" with (agreed) common and general beliefs and norms can prove relevant actors (Haas 1992). One of their basic attributed functions is to influence in particular political and administrative actors (ibid., Bandelow 2003, p. 102). As a consequence, science is increasingly concerned with high media impact and favourable public response (Weingart 2001, p. 18). Thus, science being constantly observed by the media is another new characteristic of the "knowledge society" (p. 27).

The (re)defining of the science-policy-interface is not only done by scientists. As scientific knowledge diffuses into many spheres of society the access to scientific knowledge is opened to all actor groups. In other words: the criteria of quality and relevance concerning science are no longer defined exclusively by science (Weingart 2001, p. 15).

This has been called "boundary work" (Gieryn 1983 + 1995). The assertion is, that the boundary of what can be considered to be scientific is neither self-evident nor stable over time. Rather the boundary between scientific and non-scientific is being contested and removed continuously. The meanings of terms like "biodiversity", "forest dieback" ("Waldsterben"), "ozone layer" or "climate disaster" do not represent mere physical phenomena. They have to be seen as social constructions as well: Objects of science are not given, but are chosen, interpreted and constructed

in accordance with and dependent on general social conditions (Jasanoff et al. 1995; Eser 2003, p. 161).

2.2 Boundary work and discourses

Here, discourses come into play. Boundary work is being done by means of generating discursive alternatives to established views or views of scientific and/or political opponents (Hajer 1995). According to Hajer (1995, p. 44) discourses can be understood as a specific ensemble of ideas, concepts and categorizations which are produced, transformed and reproduced in a set of social practices defining the meaning of the social and the objective world. The core of Hajers definition is the concept of *story lines*. Story lines are "a generative sort of narrative that allows actors to draw upon various discursive categories to give meaning to specific physical or social phenomena." (ibid., p. 56) In the given context scientific uncertainties are accompanied by social, economic, political and cultural biased arguments summing up to a dominant societal problem definition (Lau 1989, Schiller/Tänzler 2004, p 186). This is also called *framing* – a process of "selecting, organising, interpreting and making sense of a complex reality to provide guideposts for knowing, analysing, persuading and acting (Rein/Schön 1993, 146). A crucial aspect hereby is the definition of responsibilities. Responsibility must be tied to different institutions and actors charged with obligations and opportunities to tackle the problem. This also implies setting of priorities and identification of instruments.

Of further interest is the *strategic manner* in which policy issues are framed. Interests and values lie at the core of policy debates (Szarka 2004, 318). Since the public arena is not a field on which all can play on equal terms (some have greater access than others and greater power to shape the definition of public issues) and since the choice between competing policy options advantages some political actors over others, story lines are produced to gain discourse hegemony (Hajer 1995, 62). This means to enter the stage of policy formulation within the policy cycle and thereby suggest at least a temporary closure of the underlying problem (Schiller/Tänzler 2004, 187).

The discourse analyst now has to uncover the hidden seams, to reveal the contours of individual discourses and to identify the dynamics of interaction between the actors who originate them (Szarka 2004, p. 318). It has to be asked, for example, "who and what institution gains or is given the responsibility for 'doing something' about the issue" (Gusfield 1981, pp. 5 ff., in Keller 2004, p. 40).

A basic method is to identify patterns of argumentation and 'ideal types' of different discourse rationalities (see Dryzek 1997; Keller 2004; Rydin 2003). This is phase one; phase two relates to discourses in practise, namely *who* uses particular arguments, *how* they are used, and to *what purposes* (Szarka 2004, p. 319).

3 Two cases: About scientific-administrative hybrids and policy change

3.1 The problem of flooding

Extreme floods are the most common type of natural disaster in Europe. Floods can kill people and make people ill and homeless. They can also damage the environment, infrastructure and property. Most types of floods like normal and annual ones are 'known risks' as they have occurred over thousands of years (Wisner et al. 2004, 205): Floods affect some low-lying inland areas as a result of rainfall, and some coastlines are liable both to rain floodings and sea invasion (especially under storm surge or unusual tidal conditions). Areas at risk are predictable resp. are known from earlier events. What is known as well is the role of human activity. Deforestation in mountainous regions accelerates runoff, thereby increasing the likelihood of flooding. Urban development on former flood plains is expected to increase the magnitude of negative impacts in the area, and to also increase the possibility of floods downstream due to the canalisation of rivers (EEA 2004, p. 2).

As the relevant circumstances referring to floods are more or less known, with given rainfall or storm conditions both warnings and self and societal protection measures should be possible (Wisner et al. 2004, p. 205).

However, this basic 'expectedness' is reduced by the wide ranges of intensity and durations of floods that can affect the same area at different times, and variation in return periods (the average number of years between floods of a given magnitude recurring). Above all, trends in frequency and intensity of flood events in the future will be closely related to changes in the patterns of precipitation and river discharge, and thereby again, also to other long-term changes in the climate. Especially this assessment of climate change proves to be characterised by *prognostic uncertainties* due to general gaps in knowledge, insufficient data availability and difficulties in attributing an observed change to anthropogenic global climate change. Although much is known about the climate system and the changes in global mean temperature over the past 100 years much less is known about the

climate sensitivity, regional climate change, climate variability and the frequency and intensity of extreme events (EEA 2004, pp. 82 - 83).

3.2 Coastal protection on the German North Sea Coast between safety and risk⁴

The principal actor in charge is the public administration. Looked upon in more detail this unitary actor proves to be a far more heterogeneous actor consisting of a couple of specialized units. Looked upon in more detail it proves far from being a homogeneous actor⁵. Its core assignments are threefold:

- Technical maintenance of the dykes and other protective buildings (like sluices and water barriers)
- Dimensioning: Assessing and fixing the necessary height and firmness and related constructive features of the protective buildings
- Monitoring and integrating external expertise on technical, meteorological and climate issues.

The most relevant point with respect to our topic is how the necessary height and strength of the protective buildings are to be assessed.

The procedure in force is strictly empirical. The highest tide gauge ever measured has served and is still serving as a reference point from which all other technical data are being derived. The only element without clear empirical basis is a safety margin that is being added to the respective gauge⁶. Therefore it is seen as a procedure by which safety can be provided (and guaranteed) equally to all parts of the coast line. Meteorological conditions thus are conceived as swinging within the boundaries of the highest and lowest tides ever reported. As far as changes in the swing itself were considered, they are - more implicitly than explicitly - assumed to

⁴ http://www.artec.uni-bremen.de/files/projekte/Endbericht_KRIM.pdf; subsequently quoted as Lange 2005.

The area under investigation comprises the coastline of the mainland around the Jade bay and the respective administrative districts (Landkreise) Friesland, Wesermarsch and Cuxhaven, including the island of Wangerooge and the estuary of the river Weser up to the city of Bremen. Large parts of the area are situated at up to 2 meters below the mean high tide margin. Because of the low topology and consisting largely of supple marine sediments the coastal area is basically prone to erosion and flooding.

⁵ Coastal protection in Germany is being planned and executed at 3 administrative levels (nation state, federal states, local/municipality level covering 4 different federal states – each of them following more or less different planning concepts including different forms of providing information and allotting responsibility to citizens living in flood prone area (Lange 2005, pp. 22 ff.).

⁶ Actually the procedure is more complicated. For details see Lange et al. 2005, p. 31.

evolve in a continuous and thus linear way. Up to now, this way of assessing the necessary dimensions of flood protection has worked pretty well.

Thus, the formula "Equal safety at all parts of the coastline" has become the general guideline of how to manage coastal protection successfully. It is the formula of a safety discourse. On the political level, it was taken on and enacted by law becoming an official mission of the administrative units in charge of coastal protection in Lower Saxony (Niedersächsisches Deichgesetz).

However, within the framework of climate research (see IPCC 2001) and its risk assumptions safety turns to be an aim that can no longer be expected to really be achieved 'objectively.' Instead, different risks have to be assessed and decided upon politically. Risk related decisions can be seen as decisions following the precautionary principle. In that sense, a "risk discourse" occurred. The core question is whether and how the administrative officers in charge are ready to shift from the firmly established safety discourse to a risk discourse and whether there are impacts on assessments of coastal protection buildings today or in the near future. In particular, how do the actors cope with uncertainty as a core element of climate research regarding extent, date of occurrence, frequency and regional specifics of future extreme events?

It turned out, that the administrative officers in charge feel very uneasy with such a wide scope of uncertainty. On the one hand, uncertainty about what will and what can happen does not fit at all with the specific responsibility and professional ethos of the administrative officers. They are in charge of and dedicated to making sure that the protective buildings will be strong enough under all conditions. Subsequently, it is a matter of professional self-esteem to really be able to ensure that this goal will be achieved. On the other hand, the scientific debate on climate change, with its emphasis on uncertainty as a constitutive element, cannot be contested in general nor can it be ignored.

As the safety discourse relies on empirically assessing the required specifications of the protective buildings it was not linked in any systematic way to climate research. Instead, monitoring and assessing the scientific debate, as one of the three core assignment of the administration in charge, initially was only a kind of add-on. Here, the main function was to make sure that new information of relevance was continuously be assessed in technical respect and, if necessary, be adopted for improving the technical quality of the protective buildings. Faced with the challenge to

readjust the strategy towards emphasising the dimension of risk instead of striving for safety, which has come up in the meantime, this particular part of the responsibility is gaining importance and moderately reshaping the responsibilities of the respective units. They are assigned the function of

- assessing the findings of the scientific debate on climate change more systematically and of
- filtering and picking up findings of presumed importance for the coastal protection on the German North Sea Coast.

In practice, climate research thus tends to be divided into two parts: one of relevance and one of no relevance. Basically, there is nothing wrong with that. The important question, however, is: What is the criterion for accepting or rejecting findings of climate research? In fact, there is one general criterion: The degree of certainty data and scenarios are associated with.

Looking at the units of the administration in charge of the more technical and practical dimensions of coastal protection (assignment 1) another tendency can be recognised: namely, to only consider those findings that have been approved by their "in house" units which are responsible for monitoring and assessing the ongoing scientific debate.

Our interviews provide evidence that most of the administrative officers entrusted with the coastal protection in the respective area mainly rely on the expertise of their "own" particular units. The dominant tendency in both the units in charge of monitoring and assessing new scientific and technical knowledge as well as the units of more practical and technical responsibility is to avoid to directly refer to the general scientific debate on climate change as it is being institutionalized in the framework of IPCC - unless the "own people" would reconfirm and accept findings of the general debate as being sufficiently certain.

Thus, knowledge transformation takes place. It leads to creating a particular corpus of expertise. Being an aggregate of scientific knowledge, practical experience and administrative forehandedness, it can be seen as a scientific-administrative hybrid. It clearly represents an element of a plural conception of knowledge. Its expected practical use is to reduce uncertainty in administrative planning and, thus, to avoid costly precautionary investments. But at the same time it is an example of a rather paradoxical transformation of knowledge. It is striving for precaution without accepting uncertainty (as a core element of the precautionary principle) thus retaining

the deterministic and empirically based safety discourse and the related routines of assessing and safeguarding coastal protection without rejecting openly the probabilistic approach of the risk discourse that has become dominant within the framework of today's climate research community.

On the level of political decision-making in the domain of coastal protection in the coastal area under investigation, this procedure continues to be accepted so far. Reasons for this might be that this practice does not require additional investments and that the authorities don't have to intimidate the public with bad news on risks already in existence. Another reason might be that, so far, no severe extreme events had to be dealt with since the debate on human induced climate change gained momentum.

3.3 How to manage the risk of severe floods in river basins?

In August 2002 heavy rains led to unprecedented floods in Central Europe and caused large damages and losses of 100 human lives in Austria, Czech Republic and in South East Germany. About 100 000 people had to be evacuated. The total economic losses due to natural disaster in that year were estimated at about 15 to 16 billion €, much of it uninsured. The highest losses occurred in Germany with 9 billion € (Becker and Grünwald 2003). The largest losses refer to damages of private properties with a portion of 45.6 % (Nachtnebel 2003). Losses of infrastructure (18, 4 %) include damages of railway lines, highways and regional traffic lines, electric supply networks, communication networks and pipelines. Bridges, mostly built over the last twenty years, were destroyed to a large amount⁷. Along with the damages from the water (and sewage) came health hazards from contamination by chemical leaks, fuel and other pollutants leaking from damaged industrial plants, and enormous amounts of garbage (Wisner et al. 2004, p. 203).

The severe flood event was caused by a so-called V-b circulation pattern, a cyclone that developed in the Northern Mediterranean and travelled northeast from Genua

⁷ The position three – costs for subsequent measures – includes all subsequent costs like costs for relocation of people outside the flood plain, measures for additional flood storage schemes, purchasing of land along the river to increase the width of the cross sections and other preventive measures (Nachtnebel 2003).

to the concerned countries⁸. Some areas of Saxony, the region hit hardest, experienced the heaviest rainfalls ever reported in Germany⁹. The rainfall caused extreme floods in the Elbe river basin; the floods were considered a rarer than 100-year-event (an event that statistically occurs every 100 years). Others even consider them as rare as a 1000 year event. Anyhow, many hydrological records were broken (Mechler and Weichselgartner 2003; Nachtnebel 2003). The maximum water level during the flood in August 2002 exceeded even historic landmarks dating back in the 13th century (Nachtnebel 2003).

While Europe has never been exempt from floods (see above), the severity of the recent series of disasters seemed to have shocked not only the victims, but governments, planners and insurers as well (Wisner et al. 2004, p. 201): "It was as if wealth, infrastructure and order were being unfairly challenged by nature, in societies that considered themselves immune or robust, unlike the less developed countries (LDCs)". (ibid.) Immediately after the flood the discussion about the causes of such an extraordinarily flood started. Two argumentative streams can be differentiated. As both the frequency of floods and extreme rainfall events have increased, frequently raised arguments, especially the popular and mass media perception, referred to the impacts of global warming and climate change¹⁰ (see Nachtnebel 2003, pp. 6-8, and Wisner et al. 2004, p. 201). The second point of reference were the direct human interventions in the river basin as an additional and worsening cause – a shift in thinking regarding flood disasters as caused by people and not just by water. The consequence of those manifold interventions became obvious. In summary: modified and intensified land use increases the flood damage potential. In this context urbanisation, the sealing of large areas in the basin, of river engineering works like canalisation of rivers, and losses of the retention capacity in the basin due to flood protection measures like dikes have to be mentioned. In fact, people had settled in the traditional flood plains over the past decades leading to an increased accumulation of economic values in prone areas. Entire suburbs, e.g. in Dresden, were located in flood plain areas (Mechler and Weiselgartner 2003).

⁸ In the last decade similar circulation patterns caused the Odra flood 1997 and the Vistula flood in 2001 (also in Nachtnebel 2003). As flood events the big (winter) 1993 and 1995 occurring Rhine and Mosel floods have to be mentioned, followed by the flood in the upper Vistula basin (Poland).

⁹ In Zinnwald-Georgenfeld 312 mm were observed within 24 hours (Landesumweltamt Brandenburg; State Government of Saxonia)

¹⁰ Obviously, a warmer atmosphere may carry more water vapour and has a higher energy potential and therefore, the intensity or rainfall and the frequency of extremes are expected to increase (Schellenhuber 2002).

Mostly, this has coincided with an over-reliance on the safety provided by flood protection measures (ZENEBA 2002).

After 2002, flood discussions intensified in several European countries affected. These dealt with the question how to cope with flood risk in future. At the same time awareness arose that "rivers should be allowed to flow freely within their valleys, enabling the flood plains to be restored to exactly that: flood plains" (Wisner et al. 2004, p. 202). Here again, the media and popular conceptions of floods gained influence as they made suggestions which recognized the needs of nature and the inappropriate behaviour of people (ibid.).

In Germany the situation was special since the general elections took place shortly after the flood event. The elections, which were in their final stage, were perceived as a very close race. Intensive and immediate financing and assistance during the floods "boosted the government's poor standing in the polls during the run-up to the elections" (Mechler and Weiselgartner 2003, p. 2). That firm handling of the flood crisis was accompanied by a package of measures. The so-called Five-Point-Program was presented at a national conference on floods after the disaster. With this initiative the German government wished to avoid such devastating floods to happen again. It wanted to "draw the lessons from the flood disasters of the last few years, rather than merely paying lip service" (BMU 2003b).

Meanwhile (March 10th 2005) these measures entered into force as 'Flood Control Act' (BMU 2005). Under the new Act the Länder are *obliged* to designate more areas as flood plains than before. Water and water segments have to be identified, where flood plains can be selected to lower the risk of flood damage. The Länder are obliged to inform the general public about their decisions and the concerned public has to be integrated into the decision-making process. For areas with a high potential of damage, flood plains have to be designated within five years, in flood-prone areas within seven years.

The public has to be included into this process.

If no flood protection plans exist, the Länder have to draw up plans coordinating flood-protection along the rivers within four years. In the process of developing these plans, the interests of upstream and downstream riparian of a water body shall be coordinated. The underlying insight is that every upstream building of flood defence increases the risk for those downstream. In addition, the Länder have to designate flood-prone zones. This intends to raise awareness among the general public and the planning authorities, as more than 200 dam failures along the rivers

Elbe and Mulde proofed that dams and walls do not provide absolute protection against floods (BMU 2003b + 2005). Flood plains and flood-prone zones have to be marked in spatial plans and development plans in order to point to the danger of flooding at an early stage. The basis for designating flood plains is the so called 100 year flood (BMU 2005). Since the Act has entered into force, it is the first time now that planning new housing areas in flood plains is prohibited by federal law. No new buildings may be planned in these areas¹¹. Another “innovation” of the Federal Water Act is its requirement for individuals to keep potential damage as low as possible. In flood zones, computing centres and oil-fired heating systems, for example, should not be located in the basement (BMU 2003b).

The key message of the Five-Point-Programs consists of two points: According to the slogan: “Give our rivers more room – before they take it themselves” (BMU 2003a+b) the German Federal Government insisted publicly on the necessity of prevention and precautionary. As the issue of flood protection was defined as an issue of *spatial planning* (see Friesecke 2004) the application of various regulative instruments became possible, like the obligatory declaration of flood risk areas as priority areas. Any planning action must be compatible with this priority purpose (Friesecke 2004, p. 10). In addition, the application of participation became possible as an actual improvement and innovation of governance in this field. The message is: “Precaution as process” (compare Stirling 2003). The second message is that there remains an amount of risk as flood protection measures can’t guarantee absolute safety.

It has to be emphasised that the content of the Five-Point-Program wasn’t new at all. It was very similar to guidelines recommended by LAWA (Working Group on Water of the German federal states) These guidelines depict a forward-looking model of flood protection. Already in June 1994 the German ministers for Environment instructed the LAWA to develop the guidelines, which were drawn up in November 1995 (see ZENEB 2002). But against the activity of the government in 2002 the stipulations never became mandatory regulation due to political resistance. It needed exceptional political circumstances to disprove and to delegitimize the safety-discourse.

¹¹ Exceptions are possible if nine closely defined requirements are met. All of them have to be fulfilled completely in every individual case. They include that the municipality concerned has no alternative for human settlement development, that no lives are at risk and no significant property damage is to be expected and that the structure of new buildings is adapted to flood events (BMU 2005).

4 Discussion

A comparison of the two cases reveals interesting differences in coping with uncertainty and related risks. The differences refer to the science-policy-interface (I), the institutional setting and the actors who take action (II), and, finally, the occurrence of a "reality test" (III).

(I) Within the case of coastal protection (case A) *public administration* spans the 'boundary' between science and policy in the sense that it predominantly accepts those findings, which match with the 'safety discourse'. This discourse is based on experience and routines regarding dyke safety and on a more or less linear understanding of climate change. Elements of the 'risk discourse', which in contrast underlines the potential non-linearity of further climate change and related effects like sea level rise, are only accepted in terms of proven results. Thus, risk is not publicly addressed and uncertainties are not publicly considered. The "risk discourse" emphasizes prognostic uncertainties due to general deficiencies in knowledge and insufficient data availability as a starting point. Actually, in case B the Federal Government addressed the precautionary principle and made publicly clear that risky constellations can not be avoided once and for all, and that also flood protection measures guarantee only limited safety.

Whereas in case A basic assumptions of the general climate change debate are *transformed*, in case B the respective assumptions are *transferred*, with a concrete action program added to.

(II) In case A a particular administrative facility responsible for assessing findings of the general scientific debate on climate change (with relevance to coastal protection) has proven to be the key actor. Administrative actors in charge have successfully assumed the authority to make political decision makers accept a perspective focused on the safety discourse. There is no administrative equivalent in case B. Here, political actors take action; this might be the very reason why in this case it proved to be possible to oblige the administration, responsible for flood protection, to adopt the risk discourse.

(III) Apart from institutional factors *situational ones* are of crucial importance to explain this shift from "safety-" to "risk-discourse". The case of Coastal Protection on the North Sea Coast, which remains within the boundaries of a deterministic

perspective can be explained by fact that up to now – fortunately – it did not have to pass a reality test.

The severe floods 2002, however, can be interpreted as such a “reality-test”, which refuted the idea of being able to provide and to calculate “safety”. Comparing both cases provides strong arguments that real events like the extreme floods in Germany in August 2002 are very favourable to enhance public action, that risks are real and that ignoring them can lead to severe damages - not only in the future but even today and that extreme events may occur anew even tomorrow. The “collapse of confidence in engineered flood protection” (Wisner et al. 2004, 203) fostered a paradigm shift towards “living with floods” to be considered as something normal which can be accepted. This shift also recognizing that rivers, their banks and flood plains, provide valuable ‘ecological services’ (which can include the absorption of some flood water). It led to a growing acceptance of the need to understand the function of rivers and their flow regimes in relation to the wider environment. Following the precautionary principle, adaptive measures have to be considered and decided upon today. Thus, the flood-protection-issue is not framed any longer as an engineering challenge, but as a task and responsibility for *spatial planning*.

As outlined above, fixing responsibilities imply different institutions and different actors who are charged to deal with the problem. Of crucial importance is thus the coincidence of three elements: the “reality test”, the near elections, and the institutional framing of the issue. There can be no doubt that the coincidence of the damages produced by the floods in August 2002 and the near elections as a specific challenge to the political class to demonstrate commitment worked very much in favour of accepting the risk perspective on the political level. So, the Five Points Programme was accepted without any major problems.

Such political circumstances are well developed in Kingdon’s approach of policy windows (1984). Kingdon was especially concerned with the question why within public policy some issues and subjects emerge and are seriously considered while others are neglected. The policy-window approach provides an alternative to the problem cycle approach, which assumes a target-oriented, coordinated process with well-defined stages. Kingdon promotes the metaphor of different “streams” as an analytical framework. He differentiates between three major process streams, namely a problem stream (flood disaster 2002), a policy stream and a politics stream (public opinion, election). He holds that each stream is largely independent of the others and each develops according to its own dynamics and rules (pp. 20ff).

The policy stream refers to instruments and conceptions (Five-Point-Program), which float around in a “primeval soup” (pp 21 and 122ff).

The greatest policy changes occur when all of the three streams (problems, policies and politics) are joined through a choice opportunity or “coupled into a package” (p 21). This is what Kingdon calls a “policy window” – an “opportunity for advocates to push their pet solutions, or to push attention to their problems” (pp. 173ff). Policy windows – sometimes predictable, sometimes not – are opened by events in either the problem- or the political stream (p. 213). In case B an event both in the problem- and in the politics stream contributed to the success of the risk discourse.

5 Conclusions

Climate change can only be explained as a result of many different drivers interacting with each other. Thus, the knowledge available so far remains limited and bears fundamental uncertainties in prognosis. More sophisticated models may reduce uncertainty. However, regarding climate change and its potential threats to society there is no way to substantially avoid or even overcome uncertainty.

It goes without saying that political decision makers and administrative officers, for example those in charge of (riverine) flood and coastal protection, feel uneasy with such a constraint. But in order to cope with the problems and to develop and implement effective strategies they have to deal with uncertainty anyway.

Still, they can pursue very different strategies: They can, on one hand, reject assertions of climate research as not being sufficiently confirmed by empirical evidence. Referring to their particular knowledge and skills, they can even be successful in making political decision-makers adopt this perspective. But they can equally be brought to adopt an uncertainty-perspective by political coercion as to substantially reset protective schemes in force so far.

Accepting or rejecting uncertainty as a core message of climate research means transferring or transforming respective knowledge as a part of boundary work, thus maintaining or developing different perceptions of risk and related risk cultures. Here, institutional settings and professional cultures seem to be of particular relevance.

Differing risk perceptions are far from being unequivocal and undisputed. Rather they should be seen as competing discourses seeking for dominance within a discourse arena. This applies likewise to the “safety discourse” and the “risk discourse”

outlined above. Which of them is successful to prevail does not mirror the quality of its particular arguments directly. Actually, different settings of arguments prove relevant and convincing for different categories of actors being bound to different frameworks of interests and rationalities (especially scientists vs. political decision makers vs. administrative officers). Moreover, which of the competing discourses will be winning the day is largely depending on whether and what kind of windows of opportunity is open or not. In other words, which of the competing discourses will prevail can hardly be foreseen.

Nevertheless, the outcome can be influenced substantially by societal actors. Two aspects seem to be of paramount importance: firstly, being prepared on a conceptual level to present a particular option at the very moment when the window of opportunity starts opening. Subsequently, this particular option must have been developed in advance; secondly, the actors must dispose of means to immediately propose decisions when the window of opportunity is opening. Here, although being dependent in many respects on other societal actors, the state as being formally legitimised (by constitution) and disposing of the legal means and the power to enact its option continues to be a key actor.

There is some evidence that once such a decision is taken its relevance is not confined to the domain of the very case that it is referring to. Representing a shift within the broader discourse arena too, it may also foster changes in other ambits of controversial appraisal of how to cope with the scientific debate on climate change and climate change itself, e.g. from the field of riverine flood protection to coastal protection.

If this hypothesis could be confirmed (which is not yet possible) it would mean that paradigm shifts (from "safety discourse" to "risk discourse") do not necessarily depend on 'reality tests' in the sense of experiencing damage and harm produced by unexpected extreme events. In our case, it would allow for understanding risk in a more comprehensive way and, hence, getting prepared for and adapting to the occurrence of extreme events as long as there is still enough time left to avoid disasters.

6 References

- Bandelow, N. 2003: Lerntheoretische Ansätze in der Policy-Forschung, in: M. L. Maier, A. Hurrelmann, F. Nullmeier, T. Pritzlaff, A. Wiesner (eds.): Politik als Lernprozess? Wissenszentrierte Ansätze in der Politikanalyse. Opladen: Leske + Budrich, pp. 98 – 121.
- Beck, U. 1986: Risikogesellschaft. Auf dem Weg in eine andere Moderne. Frankfurt a.M.: Suhrkamp.
- Beck, U. 1993: Die Erfindung des Politischen. Frankfurt a.M.: Suhrkamp.
- Beck, Ulrich 1996: Wissen oder Nicht-Wissen? In: Ulrich Beck/Anthony Giddens/S. Lash (Hg.) 1996: Reflexive Modernisierung. Frankfurt a.M., 289 ff.
- Beck, U./Bonß, W. (eds) 1989: Verwissenschaftlichung ohne Aufklärung? Zum Strukturwandel von Sozialwissenschaft und Praxis, in: U. Beck & W. Bonß (Eds): Weder Sozialtechnologie noch Aufklärung? Analysen zur Verwendung sozialwissenschaftlichen Wissens. Frankfurt a.M., 7 – 45.
- Becker, A./Grünwald, U. 2003: Flood risk in Central Europe. In: Science Vol. 300, p. 1099
- BMU (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) 2003a: Jürgen Trittin: effective climate protection is flood prevention for tomorrow. European experts meet to discuss prevention measures. Press statement No. 012, February 5th 2003.
- BMU 2003b: Trittin presents draft Flood Control Act. Give our rivers more room – before they take it themselves. Press statement No. 143, August 8th 2003.
- BMU 2005: New Flood Control Act enters into force. Preventive flood protection is improved significantly. Press statement No. 111, May 9th 2005.
- Bonß, W. 2004: Zwischen Verwendung und Verwissenschaftlichung. Oder: Gibt es eine ‚Lerngeschichte‘ der Politikberatung? In: Zeitschrift für Sozialreform 1 – 2, pp. 32 – 45.
- Boudourides, M.A. 2003: Participation under Uncertainty. Contributed Paper at the Conference VALDOR 2003: Values in Decisions on Risk. Stockholm, June 9-13, 2003.
- Braun, D./Busch, A. 1999: Public Policy and Political Ideas. Cheltenham, UK: Edward Elgar.
- Dryzek, J.S. 1997: The Politics of Earth: environmental Discourses. Oxford: Oxford University Press.
- European Environment Agency (EEA): 2004: Impacts of Europe's changing climate. An indicator-based assessment (Summary)
- Eser, U. 2001: Die Grenze zwischen Wissenschaft und Gesellschaft neu definieren: Boundary work am Beispiel des Biodiversitätsbegriffs, in: Verhandlungen zur Geschichte und Theorie der Biologie 7. Berlin: VVB, pp. 135 – 152.
- Eser, U. 2003: Der Wert der Vielfalt: „Biodiversität zwischen Wissenschaft, Politik und Ethik, in: M. Bobbert, M. Düwell, K. Jax (eds.): Umwelt – Ethik – Recht. Tübingen: Francke-Verlag, pp. 160 – 181.
- Friesecke, F. 2004: Precautionary and Sustainable Flood Protection in Germany – Strategies and Instruments of Spatial Planning. Paper presented at the 3rd FIG Regional Conference. Jakarta, Indonesia, October 3-4, 2004
- Görg, C. 2003. Regulation der Naturverhältnisse. Zu einer kritischen Theorie der ökologischen Krise. Münster: Westfälisches Dampfboot.

- Grundmann, R. 1999: Transnationale Umweltpolitik zum Schutz der Ozonschicht. USA und Deutschland im Vergleich. Frankfurt [u.a.]: Campus.
- Gyrien, T. F. 1983: Boundary-work and the demarcation of science from non-science: strains and interests in professional ideologies of scientists, in: *American Sociological Review* 48, pp. 781 – 795.
- Gyrien, T. F. 1995: Boundaries of science, in: S. Jasanoff et al. (eds.), *Handbook of science and technology studies*. Thousand Oaks, Calif. [u.a.]: Sage Publ., pp. 393 – 443.
- Haas, P.A. 1992: Introduction. Epistemic Communities and International Coordination, in: *International Organization* 46 (1), pp. 1 – 35.
- Hajer, M. A. 1995: *The Politics of environmental Discourse. Ecological Modernization and the Policy Process*. Oxford: Clarendon Press.
- IPCC 2001: *Climate Change 2001: Impacts, Adaptation, and Vulnerability*. (<http://www.ipcc.ch/pub/wg2SPMfinal.pdf>).
- Japp, K.P. 1997: Die Beobachtung von Nichtwissen, in: *Soziale Systeme* 3, pp. 289 – 312.
- Jasanoff, S. et al. (eds) 1995: *Handbook of science and technology studies*. Thousand Oaks, Calif. [u.a.]: Sage Publ.
- Jasanoff, S./Wynne, B. 1998: Science and Decision making. In: S. Rayner / E.L. Malone (Eds): *Human Choice & Climate Change*. Vol. 1 *The societal framework*, pp. 1 – 87.
- Keller, R. 2004: *Diskursforschung: Eine Einführung für SozialwissenschaftlerInnen*. Opladen: Leske und Budrich.
- Kingdon, J. W. 1984: *Agendas, alternatives, and public policies*. Boston [u.a.]: Little, Brown and Co.
- Lange, H. et al. (2005): *Klimawandel und präventives Risiko- und Küstenschutzmanagement an der deutschen Nordseeküste (KRIM) - Teilprojekt IV: Politisch-administrative Steuerungsprozesse (PAS)*, Bremen
- Landesumweltamt Brandenburg 2002: *The Elbe Flood of summer 2002 (in German)*. Report of the LUA. Brandenburg, pp. 39, Vol. 73. ed. LUA, Berlin
- Lane, R.E. 1966: The Decline of Politics and Ideology in a Knowledgeable Society. In: *American Sociology Review* 31, 649 – 662.
- Luhmann, N. 1990: Risiko und Gefahr, in: N. Luhmann: *Soziologische Aufklärung*, Bd. 5. Opladen: Westdeutscher Verlag, 131 – 169.
- Luhmann, N. 1992: *Ökologie des Nichtwissens*, in: N. Luhmann: *Beobachtungen der Moderne*. Opladen: Westdeutscher Verlag, 149 – 220.
- Mechler, R./Weichelgartner, J. 2003: Experiences with financing risk management and reconstruction in the floods of 2002 in Germany (<http://idrm03.dpri.kyoto-u.ac.jp/abstractpdf/ab-mechler.pdf>).
- Nullmeier, F. 1993: Wissen und Policy-Forschung. Wissenspolitologie und rhetorisch-dialektisches Handlungsmodell. In: A. Héritier (ed): *Policy Analyse. Kritik und Neuorientierung*. Opladen: Westdeutscher Verlag, 175 – 198.
- Nachtnebel, H.P. 2003: *New Strategies for Flood Management after the catastrophic Flood 2002 in Europe*. (<http://idrm03.dpri.kyoto-u.ac.jp/Paperpdf/62nachtnebel.pdf>)
- Norse, D./Tschirley, J.B. 2000: Links between science and policy making. In: *Agriculture, Ecosystems and Environment* 82, pp. 15 – 26.
- Opielka, M. 2005: Bildung der Politik. Dilemmata und Optionen wissenschaftlicher Politikberatung, in: M. Krannich, R. Zwengel (eds.): *Gesellschaftliche Per-*

- spektiven: Stadt und Staat. Jahrbuch der Heinrich-Böll-Stiftung Hessen 2004. Essen: Klartext-Verlag, appearing.
- Paavola, J./Adger, N. W. 2004: Knowledge or Participation for Sustainability? Science and Justice in Adaptation to Climate Change. In: Frank Biermann/Sabine Campe/Klaus Jacob (eds.) Proceedings of the 2002 Conference on the Human Dimensions of Global Environmental Change "Knowledge for the Sustainability Transition. The Challenge for Social Sciences. Global Governance Project: Amsterdam, Berlin, Potsdam and Oldenburg, pp. 175- 183.
- Rein, M./Schön, D. 1993: Reframing policy discourse. In: F. Fischer/J. Forester (eds.): The Argumentative Turn in Policy Analysis and Planning. Durham: Duke University Press, pp. 145 – 166.
- Rydin, Y. 2003: Conflict, Consensus and Rationality in Environmental Planning: an Institutional Discourse Approach. Oxford: Oxford University Press.
- Scharpf, F.W. 2000: Interaktionsformen Akteurszentrierter Institutionalismus in der Politikforschung. Opladen: Leske und Budrich.
- Schellenhuber, H.J. 2002: in: Die Jahrhundertflut (Ed W. Kenntermich). Gütersloh: Bertelsmann.
- Schiller, Frank 2005: Diskurs über Nachhaltigkeit – Zur Dematerialisierung in den industrialisierten Demokratien. München: Ökom-Verlag.
- Schiller, F. /Tänzler, D. 2004: Dissent about Scientific Uncertainties: Implications in Policy Arenas. In: In: Frank Biermann/Sabine Campe/Klaus Jacob (eds.) Proceedings of the 2002 Conference on the Human Dimensions of Global Environmental Change "Knowledge for the Sustainability Transition. The Challenge for Social Sciences. Global Governance Project: Amsterdam, Berlin, Potsdam and Oldenburg, pp. 184 – 192.
- Stehr, N. 1994: Arbeit, Eigentum und Wissen. Zur Theorie von Wissensgesellschaften. Frankfurt a.M.: Suhrkamp.
- Stirling, A. 2003: Risk, uncertainty and precaution: some instrumental implications from the social sciences. In: Frans Berkhout/Melissa Leach/Ian Scoones (eds.): Negotiating Environmental Change. Cheltenham, UK: Edward Elgar, pp. 33 – 76.
- Szarka, J. 2004: Wind Power, Discourse Coalitions and Climate Change: Breaking the Stalemate? In: European Environment 14, pp. 317 – 330.
- Takacs, D. 1997: The Idea of Biodiversity. Philosophy of Paradise. Baltimore [u.a.]: The John Hopkins University Press.
- Viehöver, W. 1997: ‚Ozone thieves‘ and ‚hot house paradise‘. Epistemic communities as cultural entrepreneurs and the reenchantment of the sublunar space. PhD. A. Florence: European University Institute.
- Viehöver, W. 2004: Die Wissenschaft und die Wiederverzauberung des sublunaren Raums. Der Klimadiskurs im Licht der narrativen Diskursanalyse, in: R. Keller, A. Hirsland, W. Schneider, W. Viehöver (Eds) Handbuch Sozialwissenschaftliche Diskursanalyse. Band 2: Forschungspraxis. Wiesbaden, Verlag für Sozialwissenschaften, pp. 233 – 270.
- Weingart, P. 2001: Die Stunde der Wahrheit – vom Verhältnis der Wissenschaft zu Politik, Wirtschaft und Medien in der Wissensgesellschaft. Weilerswist: Velbrück Wissenschaft.
- Weingart, P./Engels, A./Pansegau, P. 2002: Von der Hypothese zur Katastrophe. Der anthropogene Klimawandel im Diskurs zwischen Wissenschaft, Politik und Massenmedien. Opladen: Leske + Budrich.

Wisner et al. (Wisner, Ben/Blaikie, Piers/Cannon, Terry/Davis, Ian) 2004: At risk. Natural hazards, people's vulnerability and disasters. London and New York: Routledge.

ZENEB (Zentrum für Naturrisiken und Entwicklung Bonn/Bayreuth) 2002: Zusatzbeitrag. Floods in Europe: Lessons learned? (http://www.giub.uni-bonn.de/zeneb/akt/bericht_wvr.pdf).