GKSS
FORSCHUNGSZENTRUM
in der HELMHOLTZ-GEMEINSCHAFT

Interviewing German Scientists on Climate Change: A Preliminary Study

Author:

S. Ungar

GKSS 2004/12

GKSS 2004/12

Interviewing German Scientists on Climate Change: A Preliminary Study

Author:

S. Ungar

(University of Toronto at Scarborough, Canada, and Institute for Coastal Research, GKSS Research Centre, Geesthacht, Germany)

GKSS-Forschungszentrum Geesthacht GmbH • Geesthacht • 2004

Sheldon Ungar
University of Toronto at Scarborough, Canada
Ungar@utsc.utoronto.ca

Die Berichte der GKSS werden kostenlos abgegeben.
The delivery of the GKSS reports is free of charge.

Anforderungen/Requests:

GKSS-Forschungszentrum Geesthacht GmbH
Bibliothek/Library
Postfach 11 60
D-21494 Geesthacht
Germany
Fax.: (49) 04152/871717

Als Manuskript vervielfältigt.

ISSN 0344-9629

GKSS-Forschungszentrum Geesthacht GmbH · Telefon (04152)87-0
Max-Planck-Straße · D-21502 Geesthacht / Postfach 11 60 · D-21494 Geesthacht

GKSS 2004/12

Interviewing German Scientists on Climate Change: A Preliminary Study

Sheldon Ungar

22 pages with 1 figure and 2 tables

Abstract

This study is based on in-depth interviews with 25 German scientists at the Coastal Research Institute of the GKSS-Forschungszentrum. It takes as its context the differential rhetoric and planning on climate change found in Germany and North America. The interviews try to throw light on the early German decision to address climate change, and to assess the current attitudes, beliefs and experiences of these German scientists. The results reveal a degree of complacency among these scientists, including a sense that Germany is not particularly threatened by climate change and has the capacity to adapt to it. The scientists are critical of inaction among the German population, but themselves uphold a "light version" of the precautionary principle. They have great difficulty translating the idea of climate change into popular metaphors that can be grasped by children. They strongly reject any link between German leadership on the issue as a result of a sense of guilt about the German past.

Befragung Deutscher Wissenschaftler über den Klimawandel: Eine vorläufige Studie

Zusammenfassung

Diese Studie basiert auf ausführlichen Interviews mit 25 deutschen Wissenschaftlern des Instituts für Küstenforschung des GKSS-Forschungszentrums. Hintergrund dieser Studie sind die unterschiedliche Auffassung und Planung des Klimawandels in Deutschland und in Nordamerika. Mit den Interviews wird versucht, die frühe Bereitschaft der deutschen Gesellschaft, sich mit dem Klimawandel auseinanderzusetzen, aufzuklären und die gegenwärtige Haltung, den Glauben und die Erfahrungen dieser deutschen Wissenschaftler einzuschätzen. Die Ergebnisse lassen eine gewisse Gelassenheit sowie die Meinung erkennen, dass Deutschland nicht besonders durch den Klimawandel bedroht und in der Lage sei, sich ihm anzupassen. Die Wissenschaftler betrachten kritisch die Passivität der deutschen Bevölkerung, unterstützen jedoch selbst eine „abgeschwächte Version" des precautionary principle. Es fällt ihnen sehr schwer, die Idee des Klimawandels so allgemein verständlich darzustellen, dass sie auch von Kindern verstanden werden kann. Die Vorstellung, dass die deutsche Führungsrolle in dieser Problematik aus einem historischen Schuldgefühl stammen könnte, wird strikt abgelehnt.

Manuscript received / Manuskripteingang in TDB: 21. September 2004

This paper emerged from the confluence of paradox and opportunity. The paradox originates in the divergent reactions to the Kyoto Accords found in Germany, Canada and the United States (US). Where the first is at the forefront of efforts to adopt Kyoto, the last has fully rejected it. Canada has (begrudgingly) passed the Accords, and it remains to be seen whether it will make a concerted attempt to meet the targets (thus far the answer would have to be "no"). Ideally, comparative studies of the three nations on a number of environmental issues are desirable. But in lieu of the time and resources to undertake such studies, the author, who has examined aspects of climate change and ozone loss in the North American context, conducted in depth interviews with German scientists with varying relationships with climate change research. This is, in other words, a pilot study, and the author used his position as an invited researcher in Germany to investigate the views of German scientists in the context of the North American experience and apparent "truisms" used to characterize the German experience. More specifically, the interviews try to throw light (where possible) on the *early* German decision to address climate change and to assess the current attitudes, beliefs and experiences of these scientists.

UNFOLDING THE PARADOXES

Why Germany – and for that matter the European Union (EU)? These nations trailed the US in responding to ozone loss and then bounded ahead on climate change. From a critical social science perspective, the EU position is not self-explanatory; from a US perspective, not easily digested. Perhaps precisely because Germany and many other EU nations made early and fairly rapid decisions to combat climate change, their stance has been treated as relatively non-problematic. In contrast with this matter of fact perspective, inaction by the US has generated distinct understandings and a search for more radical and innovative explanations. Here I critically compare the conventional accounts of the positions taken by the US and Germany to set the stage for the closer examination of German scientists.

Climate change emerged as a celebrity issue in North America as a result of the "greenhouse summer" of 1988 (Ungar, 1992). Prior to this summer scientists' claims were largely ignored, but now piggybacked on a social scare produced by dramatic real world events. Although calls for action became commonplace, a backlash ensued as the greenhouse summer ended. Yellowstone National Park stopped burning and Hansen felt the whip of scientific ignominy as his claim that he was "99 % certain" that global warming was real was widely rebuked. In subsequent years, despite a host of extreme weather impacts, climate change became a secondary issue and attracted considerable opposition by a relatively small number of "contrarian scientists". Abetting the later was the openness of the US political system to outside lobbying interests and scare mongering over the possible impact of Kyoto on the US economy (Skolnikoff, 1997). The US has stressed the need for further study, voluntary actions, and the use of market mechanisms to deal with the problem.

The initial German response precedes Kyoto. According to Bray and Kruck (2001: 830),

> Between 1985 and 1990, a consensus among scientists and politicians on the existence of the global warming threat was established by the first parliamentary Study Commission on the Protection of the Earth's Atmosphere. International developments and various issue linkages combined with this to make climate change a priority in science and policy. The federal government decided it wanted to be prepared and become an international pace maker, deciding in 1990 that Germany would reduce its CO_2 emissions by 25 % in 2005.

All of these – the early (premature?) consensus, assuming a leadership role, and the decision to pursue large reductions – are baffling from a North American (and social scientific) perspective. In other words, Germany reached its 1990 decision to reduce emissions by 25 % in the absence of any apparently remarkable weather impacts attributed to climate change. Thus the major "named" storms causing more than a billion dollars US in damage – "Herta", "Wiebke", "Vivian", "Daria" – occur in 1990, a few years after the issue had taken off (World Health Organization, 1994). The 1990 decision to significantly reduce emissions is also prior to any (consensus) reports by the Intergovernmental Panel on Climate Change (IPCC) or high-level international negotiations.

Now consider Andresen and Agrawala (2002: 45) on the EU:

> The EU meanwhile assumed a self-declared leadership role on climate change early on. It saw the issue in broader strategic terms as it sensed a leadership vacuum in the absence of strong US and Japanese climate policy positions. Thus the EU position was not necessarily only a reflection of concern for an environmental problem, but perhaps equally important as a stepping stone to stand forth as a strong and unified bloc on the world scene.

Yet their next sentence seems to undercut much of this analysis:

> In the same manner as there were significant differences of opinion on climate policy within the US there was no shared vision with the EU either.

In other words, some reconciliation (or at least elaboration) of the "strong and unified bloc" versus "no shared vision" seems necessary. Note, too, that Andresen and Agrawala make the claim about the EU bloc and its leadership motivations without citing any specific evidence.

Whatever the status of the bloc claims, we are still left with the issue of why, as Skolnikoff (1997: 4) puts it, the veil of uncertainty was ignored and European countries took the detection a human signal in the climate as a "settled matter?" Weingart, Engels, and Pansegrau (2000) argue that dramatic warnings by a group of scientists starting in 1986 drew an extreme picture of an "impending climatic catastrophe." This was followed by additional alarmist warnings, including a video by The Potsdam Institute for Climate Research in which weather changes were shown to bring Germany to the brink of civil war. There were also scenarios that included a 10 meter sea level rise on the German coast. Such warnings were extensively covered in the media, with the Spiegel magazine cover displaying the Cologne Cathedral under water being perhaps the most famous.

Weingart et al. note that whereas other "…German scientists tried to revoke the 'climate catastrophe' and to advance the less dramatic 'climatic changes,' the term catastrophe had gained incredible momentum in political discourse and was used from then on, whether speakers were members of the government or the opposition parties." From a social scientific perspective, however, scares have generally not succeeded simply as a result of scientific (or indeed political) claims, no matter how extreme (Ungar, 2003). As noted above, similar scientific warnings were mostly ignored in the US, and the issue did not achieve celebrity status until it piggybacked on real world events, such as the greenhouse summer of 1988. In this regard, Weingart et al. (2000: 278) note that the environmental minister attributed the German floods of 1988 – these were "unnamed" and probably subject to rapid oblivion – to natural causes. They also observe that "The absence of actual experience of climate change, a significant problem for media coverage, was overcome by a differentiated description of regional climate effects." These were in fact potential *future* scenarios. While this disparity cannot be resolved here, this study examines the extent to which German scientists currently envision a climate catastrophe or "Klima-Spergau."

A further explanation for the EU climate change decisions points to the increasing power of the Green movement. Public opinion was green in virtually all Western states through the late 1980s and early 1990s, but in North America, as compared with Germany and England, it did not attain any electoral success. In the later countries it is presumed that there was an attempt by the major parties to pre-empt green issues. While this factor does appear to be important, questions pertaining to which issues the Greens targeted and why the governments targeted climate change rather than other environmental problems are largely ignored. Thus in North America much of the green consciousness was directed toward recycling and green consumerism (Ungar, 1998). The present study examines green attitudes among German scientists.

Related to this is the belief that the precautionary principle matters more in Europe than in the US. This may well be the case, though again little evidence is actually brought to bear on the claim. There is also the risk of a circular logic here: Europeans have taken a more precautionary stance on climate change, and this observation is then used to surmise that they believe more in the precautionary principle as such. This is especially the case if we look beyond stated commitments and examine both national and individual *actions* on climate change. Most EU nations seem likely to fall well below their commitments, and green consumerism has declined significantly in both the EU and North America since the heady days of the late 1980s. The precautionary principle and perceptions of actions among scientists will also be examined here.

Finally, there is the special situation in Germany that must be noted. According to Skolnikoff (1997: 12-13), there is a widespread belief both inside and outside Germany that a key factor influencing its policy is the lingering guilt over the Hitler era. Beyond a greater willingness to sacrifice and an enhanced fear of risk, there is the sense that Germans need a moral issue to support to offset their (presumed) sense of guilt. This will be a key question addressed here.

THE STUDY

The sample for this study is composed of 25 German scientists and scientific students at the GKSS-Forschungszentrum, Geesthacht (two were actually from the University of Hamburg). Most of the scientists work in the Coastal Research Institute and focus on topics ranging from paleoclimatology to storm surges and sea level rise, environmental pollution, climate modelling and analysis, and climate history. Scientists at the Coastal Research Institute were solicited for the study first by e-mail from the Director of the Institute, Hans von Storch. They were then approached personally and asked to participate. While no one refused, several of those contacted personally were not interviewed due to scheduling problems.

There are a number of clear limitations to the sample – and the research itself. The 25 respondents are a convenience sample and cannot be considered representative of German scientists in any sense. Most of respondents do research with some relationship to climate, but only two claimed to be climate modellers. The size of the sample also restricts quantitative analyses. In effect, this is no more than a pilot study aimed at raising issues that might be worth pursuing in future research.

Interviews took from about an hour and a half to over two hours. They were conducted in July and August of 2003. There were 30 questions. The interview schedule was circulated for comment among several colleagues and was pre-tested on three scientists who were asked for comments, the need for clarification, and so on.

The main challenge for the interview process was language. The author spoke no German, while virtually all the scientists spoke English reasonable well, even though they often asserted that their English was poor. At the same time, the author was from a foreign culture with an obviously limited knowledge of things German. If these differences made for some difficulties – occasionally respondents could not find the words for saying what they meant and reverted to German – they opened up opportunities as well. The linguistic and cultural differences allowed great scope for reformulating questions and probing for details that might have been invasive in the absence of these differences. Respondents unfailingly made great efforts to explain themselves, and the linguistic and cultural differences opened the possibility of asking difficult questions without being apparently insulting or invasive.

INTERVIEW RESULTS

1 Environmental Attitudes

Interviews began with a few quantitative questions. Respondents were first asked to rank the importance of five public issues, on a 1 to 5 scale, "based on how important they were to them." The mean results for the 25 respondents are presented in Table 1, with a lower score indicating that the issue is more important to them. Apparently, unemployment and health care are seen as the most important issues, followed by crime. The environment and boosting the economy rank somewhat lower.[1] Another way of looking at the results reveals that only three of the 25 respondents rated the environment as the top issue (i.e., score = 1), which

seems to indicate a substantial change in attitudes since the start of the 1990s. These results are broadly consistent with those reported in Environmental Awareness in Germany 2000 (Federal Department of Ecology, 2002), a random survey of German public opinion. In looking at attitudes, it reported that there has been a decline in environmental concern in the late 1990s, with a partial recovery in 2000. Still, the environment ranks somewhat below secure health care (the top issue) and protection against crime.

The next panel in Table 1 shows respondents' ranking of five environmental issues, on a 1 to 5 scale, based on how important they were to them. The results indicate that the purity of water and the preservation of nature are the most important concerns. Climate protection is the fourth ranked concern, with genetic engineering a distant fifth. Of the 25 respondents, only two ranked climate protection as the greatest concern. The only comparable data from Environmental Awareness in Germany 2000 deals with the risks of genetic engineering. Here the scientists and the public seem to part ways, as almost three fourths of survey respondents rated genetic engineering as dangerous or more likely dangerous. Only 3 % of the public thought it not dangerous.

The next question used a four-category scale (excellent; very good; adequate; poor) and asked, "How good of a job do you think Germany has done in protecting the environment in general." Scoring the responses from 1 to 4 (1= excellent), yields an average of 2.7, or just better than adequate. Results from Environmental Awareness in Germany 2000 reveal that 69 % of respondents think the German environment rather good. At the same time, 73 % believe that the federal government should do more for environmental protection.

The final quantitative question used a four-category scale (very serious; quite serious; somewhat serious; not serious) and asked, "How serious do you think the threat of climate change is in Germany?" Scoring responses from 1 to 4 (1 = very serious), yields an average of 3.1. Effectively, the scientists believe that the threat is somewhat serious. Notably, no one ranked it as "very serious". In this vein, survey results obtained by Bray and von Storch (2003) support the interview results presented here. Figure 2.c reveals a reversal in the threat perceptions of German and American scientists, with the former currently believing that the threat of detrimental effects for their society is lower than the latter. Also to be noted is the significant drop in concern among German scientists from 1996 to 2003. This will be elaborated on below.

2 The Threat to Germany from Climate Change

Following on this question, respondents were asked why they think that climate change poses a (in most instances) "somewhat serious" threat to Germany. Excepting three cases, none of the responses are consistent with scientific warnings of a "impending climatic catastrophe" that ostensibly directed German responses in the 1980s (Weingart et al., 2000). There was almost a consensus that "Germany is not in a climate region at risk." Many noted that the threats are not as serious as in other places, and the German ecosystem was described as

"robust." While there is uncertainty about the possible impacts, it was also widely observed that Germany also has a strong economy and can respond to changes.[2]

The ensuing question asked for examples of how climate change poses a threat to Germany and, somewhat surprisingly, many respondents suggested nothing or really very little. It was noted that "changes would be small," "other problems are worse," and the capacity of Germany to adapt was stressed. About a half of respondents, usually after some prompting, mentioned floods, sea level rise, and warmer weather (with a couple seeing a benefit in the latter). The three who rated climate change as "quite serious" mentioned storm surges and glaciers melting.

Following on this line of questioning, respondents were then asked if they could "think of any recent events that might have been due to climate change." Again, responses were tentative and uncertain. Almost all mentioned floods, particularly of the Elbe of 2002, but almost half of these added that these were normal phenomena and occurred in the past. Thus one noted that while newspapers cited the flood as an instance of climate change, her colleagues in the climate domain said it was not. (The Elbe flood of 2002 was only marginal compared to the floods that have occurred over the last 200 years.) Several mentioned the unusual heat of this summer (i.e., 2003), but again expressed uncertainties; one scientist noted the cold of the previous two years. Presumably, the interviews were picking up scientists acting as good scientists – exercising caution because they know that not every extreme event can be directly attributed to climate change. To some extent, this caution may also apply to the previous question pertaining to how climate change poses a threat to Germany, since climate models remain poor at identifying impacts at regional levels.

Respondents were then asked how climate change will affect Germany in the future, the latter defined as 50 years hence, i.e., the middle of this century. (Note that the previous questions pertaining to the seriousness of climate change purposively did not provide a time frame, so that respondents could define it themselves.) In this regard, results from Environmental Awareness in Germany 2000 reveal that 41 % of the public think that a noticeable warming will occur in the next 20 to 50 years, and 50 % think it probable. Just over half of the scientists interviewed envisioned quite negative effects, ranging from much hotter temperatures, increased storms and floods and the potential for environmental refugees. Yet about 40 % of scientists felt that there would not be much impact or that there was too much uncertainty to predict future impacts. Again, at least 20 % stressed that the German economy and climate were robust and that the country could adapt to the changes.

To get as close as possible to the idea of a "climate catastrophe" that ostensibly drove the German political discourse in the late 1980s, respondents were then asked what might be the largest climate-related accident that might affect Germany. While 40 % of respondents mentioned the abating of the Gulf Stream or Atlantic conveyor belt, this group split equally, with half believing it a real threat and the other half asserting that it is a theoretical or unlikely possibility. Perusal of responses indicated that 40 % envisioned some sort of real climate catastrophe – "Hamburg swimming" and the spread of dangerous diseases were notable examples. However, only about half of these respondents held that catastrophic events were

likely, rather than merely possibilities. The remaining majority mentioned increasing floods or storms, but did not paint a catastrophic scenario or hold that the increase in extreme weather would be uncontrollable. Despite my prompting to get respondents to fill in events as far as possible, examples like persistent drought leading to critical crop failures were not regarded as likely.

In all, there was a degree of complacency among the scientific respondents.

Perhaps 20 % revealed a real fear of impending climate impacts, what one respondent designated as "enormous consequences." The majority were cognizant of a range of impacts but did not convey a sense of alarm. Where we previously noted that German scientists sought to replace the threat of a climatic catastrophe with the more manageable notion of climate change, the clear majority of those interviewed here are in accord with the latter position. To tie all this together, the final question in this context asked whether there might be any positive changes in Germany as a result of climate change. Consistent with the data already examined, 25 % percent thought there would be no positive changes. The majority stressedf things like warmer summers, milder winters with lowered heating costs, and improved crop yields. (Note that this may be a local phenomenon due to the North Sea driven climate in the Hamburg region.)

3 Bridging Metaphors and the Selling of Climate Change

Climate change, like any social problem, must be marketed to audiences in an attention economy where people are highly selective about the information they take time to notice and process (Ungar, 2000). However, as a charter example of "post-normal" science, climate change faces some severe market liabilities (Bray and Von Storch, 1999). In a comparison of the relative success of climate change and the ozone hole, Ungar (2003) found that a signal advantage of the latter is that it can be encapsulated in a simple and widely familiar "penetration" metaphor. Stated succinctly, the hole leads to the increased bombardment of the earth by lethal rays. The idea of rays penetrating a damaged "shield" meshes nicely with abiding and resonant cultural motifs, including "Hollywood affinities" and video games. That the ozone threat can be linked with Darth Vader means that it is encompassed in common sense understandings that are deeply ingrained and widely shared.

These linkages also provide a resource for lay theorizing. That is, if a popular cultural template affords an appropriable theory, an "object-to-think" with or that can be "played with" – as in Freudian analysis of dreams – it has the capacity to go beyond the scientific domain and to capture the imagination of the public at large (Turkle, 1999). It is conversational presence, encompassing things like talk radio and informal talk related to mundane practices, rather than media coverage per se, that can put an issue in the air and let it acquire a life of it own.

The importance of mundane metaphors that ordinary people are able to think with can be seen in a comparison with climate change. It is apparent to anyone that the "hole" or "crater" is an

aberration, something that a protective shield should not have. The greenhouse effect, in contrast, is a benign and essential natural phenomenon. Global warming (or climate change) is an extension of this phenomenon, creating the problem of finding the human "fingerprint" amidst highly variable and complex natural processes. Effectively, there do not appear to be any ready-made metaphors in the popular culture that mesh with and provide a simple schematic for understanding the science of climate change.

To concretise these ideas, the interviews included a number of questions pertaining to how scientists would explain these two problems. To begin, they were asked if they could think of any "images or pictures" that helped them understand climate change or render it real. The responses were, as might be expected, quite limited in scope. About 25 % referred to climate data, curves to compare different periods. Beyond that, the vast majority cited floods *and* drought or desertification as their images of choice. (Noteworthy here is that these contrary outcomes have been widely used by contrarian scientists in North America to query what kind of weather is *not* linked to global warming.) Only one respondent proffered the well-known image of the "Dome of Cologne under water."

They were then asked what they thought the relationship is between climate change and the ozone hole. This question was driven by the research indicating that members of the public confuse the two problems and tend to see climate change as a subset of the ozone hole (Ungar, 2003). This is not a problem for scientists, however. Only one respondent demonstrated any confusion between the two (ozone loss increasing temperature); all the rest asserted that they were different problems and most also noted that CFCs are a greenhouse gas.

The next two questions tied in directly to the idea of bridging metaphors. Specifically, they were asked how they would explain the ozone hole (and then climate change) to a child of about 12. This age was selected as it was assumed that the child's basic understanding of science would not yet be sufficient to explain the problems largely in scientific terms. It was apparent that most of our respondents had not dealt with this question before and they evinced some frustration trying to convert the science into something more tangible and understandable to a young person. Their spur of the moment responses for the ozone hole revealed a range of ideas, with the image of a hole in a protective shield or umbrella that lets in dangerous radiation predominating. A science fiction type of model was used by nine of the respondents; another spoke of an "atmospheric wall". A few suggested the idea of "sunglasses for the earth", as well as using a magnifying glass to burn holes to illustrate the power of sunlight or the sun being, as a result of the hole, too intense. Half a dozen respondents held to a more scientific model dealing with protective gases, emitted chemicals, and so on. Three said that they didn't know how they would do it; one said she could do it in German.

Climate change was something else. Just over half, i.e., 13 respondents, immediately volunteered that climate change was "more difficult", "substantially more difficult", or "more complex". Thus one questioned whether children would ask about the issue and asserted that it could be explained in a "scientific way when they were older". Another asked how you

could explain the importance of a one-degree temperature change over 100 years. Unlike the case of the ozone hole, respondents did not effectively come up with images outside the scientific realm. A few mentioned relying on the model of a greenhouse, and one suggested the idea of a tent. For the remainder, there were only a few (scientifically-based) efforts to explain climate change. Instead, most tended to list consequences, from floods through higher temperatures, droughts and melting glaciers.

Scientists are not popular purveyors of science, and they were seemingly put on the spot by the challenge of explaining the issue to children. Still, the results are consistent with the claim that climate change is not amenable to simple and forceful metaphors drawn from the popular culture. The scientists' arsenal for selling the problem is apparently limited to extreme weather impacts, and these have all sorts of liabilities (Ungar, 1995). Popular science writers and activists have long sought framing and metaphors to facilitate the marketing of climate change, but have had limited success.[3] As compared to the straightforward links between causal emissions and the consequences of ozone loss as embodied in a penetration of a shield model, links between the factors producing climate change and the actions that can be taken to combat them remain murky and diffuse.

4 Actions and the Precautionary Principle

The phenomena thus far analyzed – environmental attitudes, risk perceptions and models and metaphors of climate change – can be bracketed when it comes to the next topic: action. The relationships between the former and the latter are often tenuous. Green attitudes do not necessarily convert into actions, and surveys in the U.S. show that the public has little idea of the actions that should be taken to combat global warming (Ungar, 2003). This section examines perceptions about actions among the scientific respondents.

On the question of whether the German federal government is doing enough to combat climate change, 52 % replied yes, 28 % said too little, and the remaining 20 % said too much. In comparison, Environmental Awareness in Germany 2000 revealed that 73 % of the German public thought the federal government should do more for environmental protection. A closer look at the scientists revealed that 20 % specified Germany was doing enough in comparison with other nations. Though the number of cases is small, there does not appear to be a clear correlation between fear of a climate catastrophe and perceptions of how the government is doing. Thus less than half of those who held that the government was doing too little envisioned a future climate catastrophe for Germany.

The ensuing question asked whether there was anything else the federal government should be doing, and the responses here were all over the map. Among those who said the government was not doing enough, there were calls to "force industry to reduce emission", for more incentives (or less tax) on energy efficiency, and more money for research and public education. Similar, but fewer, responses were found among those who thought the government was doing enough. However, fully 40 % of the sample said nothing else should

be done. No one broached the idea of emergency actions along the lines of the Marshall Plan (or the Manhattan Project, a metaphor used by American activists).

In contrast with the government, scientists did not see the public as doing enough. Only three said they were doing their share, and two of these still listed some additional actions they might do. The vast majority held that the public was not doing enough, or doing nothing. Virtually all held that the public needed to be more energy efficient, with a particular focus on less use of cars and more use of public transit. There was a broad sense that the public wasted energy and needed more education as they were seemingly unaware of this. Only four respondents drew any links between the public and the government.

Among our scientific respondents, at least, the precautionary principle rules. Only one said "no" in reaction to the question of whether action should be taken on climate change even if the science is uncertain. All the others were relatively emphatic about their "yeses". There was a clear sense that things could get worse and that it might be too late to act if we waited until all the evidence is in. Surprisingly, perhaps, only three framed their explanation in terms of a "no regrets" strategy. The same number noted that we couldn't expect to do too much, given the potential costs and uncertainties. Only one respondent observed that there were already real climate problems, citing the case of Bangladesh. Two others stressed the possibility of catastrophic outcomes if nothing is done. Thus again there is a perceived need to act but not any dire sense of urgency.

Finally in the context of uncertainty, respondents were asked how they would respond to researchers who question the reality of climate change. This question yielded wavering and uncertainty. About one third indicated that they didn't know, and most of these held that those outside the mainstream might be correct. Close to a third said that they had to believe the experts. Persuasive arguments amounted to citing the IPCC (2 cases) or pointing to long term data (3 cases). Effectively, this sample was unprepared to deal with climate sceptics (or contrarians) – just as they were unprepared to explain the problem to children. To be fair, climate sceptics have been much less prevalent in Germany or the EU for that matter than in the US. This can be seen in the reaction to a study by Soon and Baliunas that presented data indicating that temperatures were higher in medieval times than in the late 20th century. Besides a slew of critical e-mails and a direct critique of the paper, several of the editors of *Climate Research*, a European journal that published the paper, resigned as a result of the conflicts that emerged around the publication and threatened changes in the review process.

5 The Special Standing of Germany

The first question in this section noted that Germany has been able to lower its emissions of greenhouse gases quite significantly and asked how this was done. Almost 60 % of respondents immediately pointed to the closing of industry in East Germany as the main reason. About half of those who referred to East Germany suggested that emission reductions were thus "a trick" or "not for real" as this was a one-time opportunity and industry would

recover in the East. About one third mentioned increases in energy efficient technology, while three said they didn't know the answer. Consistent with the previous results reported for individual actions, only one response alluded to the German population as being environmentally sensitive. The German Green Party also received one mention.

There is a long-standing view that Germans have a "special relationship" with nature, and respondents were asked to comment on this. Whether this idea is more fabled than founded, it struck a chord with less than half the respondents. On the positive end, German romanticism and the centrality of woods and hiking were mentioned. But about an equal number (generally the younger scientists) denied this, arguing that Germany was small, densely settled and had large urban areas. For many, the romantic movement, if it existed at all, was a thing of the past (especially pre-World War l) and no longer of significance. Virtually none of the respondents saw any real or strong connection between the ostensible relationship with nature and the German response to climate change.

The final section of the interview moved into the realm that is most difficult and sensitive. It deals with the issue of lingering guilt over the Hitler era, with specific queries about sacrifice and morality (Skolnikoff, 1997: 12-130). The opening questions were purposively vague. The first asked if Germany should take the lead in the EU to combat climate change, and two-thirds of the scientists replied yes. Thus one response was, "Who else?" (Note here that Germany contributes a higher proportion of its GDP to the EU than any other nation.) To be clear here, the German lead was qualified, with a sense of Germany leading by example largely because of its strong economy and technological capacity. As with those who didn't think Germany should take the lead, there was the sense that all EU countries should ultimately contribute about the same amount. Significantly, three of those who thought Germany should not take the lead drew on historical explanations. They were not confident about leading as this might reflect "arrogance" or "German dominance." Indeed, one held that the German past disqualified the country from assuming leadership, especially since others might not trust it. Notable, all of these were older scientists – close to 50 years old in any case.

The second question asked, "Is there anything that makes Germany unique or special in dealing with climate change? Altogether, 14 respondents immediately volunteered "no" (n=10) or "don't know" to this query. A few others pointed to a variety of differences ranging from green taxes to a bit more environmental awareness. Four scientists brought up something to do with the German past. In more detail, two mentioned that the "past in Germany" led them to be "careful" or "to show the world how to be peaceful."[4] One referred to the success of the Green Party and added that Germans were "susceptible to ideological appeals." This was "paved by history". The final respondent in this context observed that after losing two wars Germans were sensitive to risks and regarded change as risky.

The subsequent question asked, "Do you think Germany should sacrifice more than other nations." Twelve respondents gave an assertive "No" to the question – the emphatic "definitely not" capturing much of their sentiment. In contrast, four respondents gave a clear yes, while the remainder wavered, saying "someone must lead" and "we should do what we

can." Among the yeses was the sense that "Germany always pays more" and that leadership imposes costs. Significantly, perhaps, not a single respondent voluntarily offered an historical explanation for his or her response.

The ensuing question asked if Germany should provide moral leadership for other nations. Four respondents said yes, and 21 no; the latter were typically emphatic. One of the yes respondents held that past German militarism did not engender guilt but a sense of being responsible. Two of the no respondents also invoked the past on their own, asserting that because of the Nazis they had forfeited their moral standing and that Germans should not behave like "moral apostles".

At this point, the vast majority of respondents who had not invoked historical explanations on their own asked by the interviewer if the "German past" had any relevance for the questions of sacrifice and morality. This interviewer prod, which aimed as far as possible to avoid insensitivity, immediately invoked strong denials. Beyond the few who had mentioned the past on their own, the others rejected any influence from the past; indeed, they were vigorous in this rejection and in a few cases seemed somewhat surprised by it. In other words, nothing the scientists said indicated that German leadership on Kyoto was a result of a lingering sense of guilt. The past, when invoked at all, seemed to be a reason to disqualify German leadership.

DISCUSSION AND CONCLUSION

The results from the 25 interviews – recall that this is a non-representative convenience sample – are interesting in several respects. But since the limitations of the data do not allow any firm conclusions, this section will go beyond a summary and try to set forth some bolder claims with the aim of provoking thought rather than trying to settle issues.

First, the results are broadly consistent with those of Environmental Awareness in Germany 2000. Both suggest that neither the environment in general nor climate change remain at the top of the public issue agenda. The scientists reveal a degree of complacency about the risks faced by Germany (both now and the future) and the capacity of Germany to respond and adapt to climate change. Only about 20 % of the scientists seemed clearly concerned about a climate catastrophe, and even fewer portray a sense of urgency about the problem. Weingart et al. (2000) also note that by the mid 1990s the idea of a climate catastrophe had been routinized by the government as part of the issue of sustainable development. The media, in contrast, continued to portray the idea of a climate catastrophe.

In research on *climate* scientists from Canada, the USA and Germany, Bray and von Storch, (1999: 452) found that German scientists (in 1996) were the most likely to agree that there is a need for immediate policy decisions, the most likely to perceive that climate change will be detrimental for their home country, and most likely to agree that societies will require substantial changes. However, their replication of this research in 2003 found that German climate scientists were now significantly less concerned about detrimental effects than in the

past, and less concerned than American scientists (Bray and von Storch, 2004; see Figure 2c). Again, then, despite the limitations of the present interviews, the results are seemingly consistent with those obtained in more systematic surveys.

Europe has had erratic weather in recent years, though the scientists interviewed here showed some reluctance to point out weather impacts that might have been due to climate change. (Unpromisingly, in terms of the rapid oblivion of events, there was not one mention by our respondents of the storms of 1990 or "Lothar" or "Martin" from 1999; the question of whether "named events" can still be recalled needs to be pursued.) If, as Weingart et al. (2000) argue, claims about an impending climate catastrophe galvanized German action on the issue in the late 1980s, they pointedly downplay any links between the catastrophe claims and actual extreme weather impacts. Rather, they point to media descriptions of future impacts that are of course hypothetical. They also observe that there was greater consensus about the issue in Germany, especially in the media, which tended to ignore the claims of climate skeptics and the problems of uncertainty. This may have been abetted by the fact that there is one climate model in the German scientific community, unlike the three or four models prevalent in the US.

A further possibility here is that in the absence of extreme weather impacts, the issue piggybacked on wider environmental concerns, as concrete examples of environmental damage became visible in Europe from the late 1970s on. Certainly the idea of "Waldsterben" – the dying of the forests – became a commanding concern during this period. There was also visible signs of the fossil fuel economy, as Germany is a relatively small country with heavy industry. Thus the Ruhr area was "black" from the use of coal and required a major cleanup. Urban planning has not been as common in Europe as in the US, and relics of industry were more of a daily vista than tucked away in industrial belts. By the late 1980s, the environment became such a key issue that the stage was set for a "green beauty contest" (Andresen and Agrawala, 2002: 46). In Europe, climate change happened to be the timely issue after the US-led resolution of the problem of ozone loss. In North America, at least, recycling won the beauty contest.

Robert Shiller (2000) uses the term "irrational exuberance" to characterize events like the hi-tech stock market boom. Irrational is not overly biased here, since the market boom was based on false premises or hopes and was quickly followed by a staggering price crash. In the present context where there is no basis for terming action on climate change irrational, I suggest the term "exuberant moment" to describe the 1990 German decision to reduce its CO_2 emissions by 25 % by 2005. Here we have a convergence of events and interests in a favorable issue culture that result in radical actions that might *only* come to pass at *that* time. From a backdrop of visible environmental problems, to an acquiescent public not yet informed about the possible costs of greenhouse gas reductions or exposed to many uncertainties or greenhouse skeptics, through the ozone success and the possibility that the EU nations were putting forth plans cynically to reap the benefits of proposing major reductions knowing the US would not agree (Skolnikoff, 1997), climate decisions in Germany might be considered ripe and overdetermined at *that time*. But by 1994 the German

government had moved away from the theme of a climate catastrophe and routinized the problem as the costs of meeting reduction targets became clearer.

The EU continues to require its member states to submit plans to reach their targets. It also continues to pressure Russia and the US to get on board with Kyoto. Yet most members of the EU continue to fall behind in their emission reductions, and some resistance by industry has surfaced, especially as competition for growth and productivity with the US has become more acute. The interview results presented here reveal that almost all the scientists thought that the public was not doing enough – really nothing in most instances – to reduce their emissions of greenhouse gases (although these are much lower per capita than in the US). The questions posed here about popular metaphors for grasping climate change also yielded a paucity of results, suggesting that public understanding of the issue is likely to be quite limited as well.

There is support among scientists for the precautionary principle, though it appears to be the "light" version of this principal that is being propped up. The results reported by Bray and von Storch (2004) reveal a significant decrease in perceived detrimental effects for Germany. Looking backwards, one can wonder whether the current attitudes and perceptions among scientists would provide sufficient support for the path breaking German decision of 1990. Thus I postulate that German – and then the EU – set up their actions plans in moments of exuberance, but subsequent developments have attenuated concern, interest and commitments.

Scientists are not journalists, but they had great difficulty translating climate change into something that nonscientists might grasp. This was especially the case when it came to making the ideas available to children. Certainly this is not an easy task, and the hunt for popular metaphors continues. Still, there was a clear sense that most of our respondents had not previously engaged this challenge. One issue that the interview did not address was the extent to which scientists communicate with politicians and bureaucrats, the media and members of the public. If there is very little communication to these groups, there would also be little incentive to develop the ability to do so. These communication questions need to be further pursued.

The last section of the interview dealt with the question of lingering guilt over the Nazi past. A series of items about German uniqueness, sacrifice and moral leadership generated only a handful of responses that drew on the past. A probe at the end of this series by the interviewer about the effects of the "German past" on these concerns yielded a wall of silence. The probe about the past was simply not picked up, so effectively the conclusions drawn here are based on omissions. But excluding the handful of exceptions, most of the responses were forceful and adamant: Germany is not unique and should not sacrifice more or provide moral leadership. Those who wavered allowed for Germans to lead by showing the way, a sense that they would be a step ahead and others would quickly follow (especially in terms of technology). The exceptions went in the opposite direction that was anticipated. They asserted that Germans had forfeited moral leadership due to their history and they should avoid any suggestion of traditional German arrogance. Put in reverse, not a single scientist drew a direct link between guilt over the German past and their leadership on climate change.

Scientifically, it is best to begin with your data and to honor it sufficiently so as not to dismiss it outright. The present results suggest that the 25 scientists interviewed do not believe that the German past has any direct relevance for their nation's stance on climate change. The dismissal of the past appeared to be quite resolute; there was little in the way of reflection or even hesitation in the answers provided. Given both the importance of the Nazi past and the vehemence of the responses, the possibility that the questioning was too oblique and misunderstood can be set aside. A further possibility that cannot be so easily dismissed is that respondents did not want to deal with this issue with an outsider. I will not speculate on this, since, if the topic is deemed worthy of pursuit, further enquiry should be done by German researchers. This would resolve the stranger issue, as well as language difficulties.

If our findings contradict the idea of a special moral burden for Germany, they must be put in perspective. They *only* indicate that the repudiation of German guilt applies to climate change; this may or may not generalize to other issues. There is also no way of knowing whether the convenience sample of scientists interviewed here are representative of scientists in general. Nor it is clear that they are representative of German policy makers, or public opinion more broadly.

At the same time, it is possible that the significance of the past is attenuating. More than other nations (ranging from Japan through former communist regimes to even [Vichy] France), Germany has confronted its past. It has also provided substantial compensation to many of its victims. At some point, the invocation of a shameful past is bound to wear thin, especially for younger generations. Collective memory needs to be constantly reinforced, a process that can eventually engender reactance.[5] German leaders may still frequently apologize for Germany on the international stage, but at some point younger Germans in particular may experience guilt fatigue. In recent years there has been increased attention paid to the bombing of German cities, with the idea of victim hood dislodging some of the guilt. Finally, a reviewer suggested that the question of lingering guilt may just be a social science construct based on a misapprehension of the German reality. I would think these questions merit further, more systematic investigation.

Table 1: The Importance of Various Social Issues.

ISSUES	AVERAGE SCORE
Protection against crime	3.0
Secure health care	2.5
Boosting the economy	3.4
Fighting unemployment	2.4
Environmental protection	3.4

Table 2: The Importance of Various Environmental Issues.
(The lower the score, the higher the importance.)

ISSUES	AVERAGE SCORE
Purity of water	2.1
Air pollution	2.7
Preserving nature	2.2
Climate protection	3.1
Genetic engineering	4.3

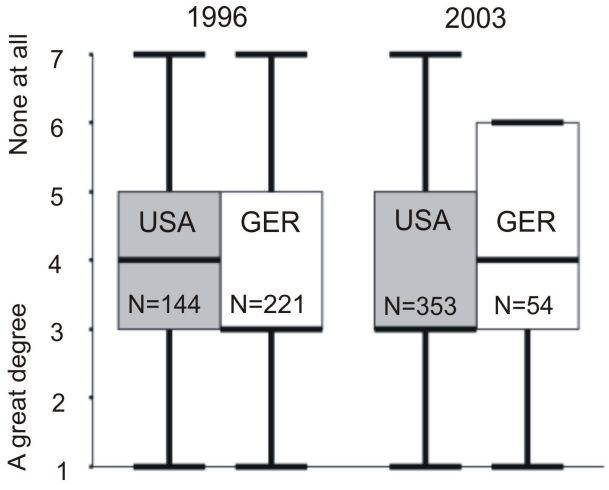

Fig.2.c.To what degree do you think climate change will have a detrimental effect for the society in which you live?

_: USA 1996 = 3.79, 2003 = 3.67;

GER 1996 = 3.63, 2003 = 4.26

Sig. Δ _: GER 96 – 03; USA-GER 03

Sig. Δ _: USA 96-03; GER 96 – 03; USA-GER 03

Figure 2c:

Perceived Detrimental Effects of Climate change.

REFERENCES

[1] Andresen, S., and Agrawala, S. (2002) Leaders, pushers and laggards in the making of the climate regime. Global Environmental Change 12: 41–51.

[2] Bray, D., and Kruck, C. (2001) Some patterns of interaction between science and policy: Germany and climate change. 19: 69–90.

[3] Bray, D., and von Storch, H. (1999) Climate science: An empirical example of postnormal science. Bulletin of the American Meteorological Society 80: 439–455.

[4] Bray, D., and von Storch, H. (2004) "The Perspectives of Climate Scientists on Global\Climate Change 2003" A Survey of Climate Scientists.

[5] Federal Department of Ecology. (2002) Environmental awareness in Germany 2000. http://staff-www.uni-marburg.de/ %7ecmperzwi/englisch/hauptframe.html.

[6] Shiller, R. (2000 Irrational exuberance, Princeton, NJ: Princeton University Press.

[7] Skolnikoff, Eugene B. (1997) Same science, differing policies: The saga of global climate change. MIT Joint Program on the Science and Policy of Global Change. August. Report No. 22.

[8] Turkle S. (1999) Looking toward cyberspace: Beyond grounded sociology. Contemporary Sociology 28: 643–648

[9] Ungar S. (1992) The rise and (relative) decline of global warming as a social problem. Sociological Quarterly 33: 483–501

[10] Ungar S (1995) Social scares and global warming: Beyond the Rio Convention. Society and Natural Resources 8: 443–56

[11] Ungar, S. (1998) Recycling and the dampening of ecological concern: The role of large and small actors in shaping the environmental discourse. Canadian Review of Sociology and Anthropology 35: 253–276

[12] Ungar, S. (2000) Knowledge, ignorance and the popular culture: Climate change versus the ozone hole. Public Understanding of Science 9: 297–312

[13] Ungar, S. (2003) Global Warming versus Ozone Depletion: Failure and Success in North America. Climate Research 23: 263–274.

[14] Weingart, P., Engels, A., Pansegrau, P. (2000) Risks of communication: Discourses on climate change in science, politics, and the mass media. Public Understanding of Science 9: 261–283.l

[15] World Health Organization. (1994) From Disaster Management to Sustainable Development: How the Public Sector, Private Sector, and Voluntary Organizations Can Work Together.

Endnotes

[1] Given the use of a small convenience sample, statistical tests would be inappropriate. The results are merely intended to be suggestive.

[2] As revealed in Figure 2.b. below, Bray and von Storch (2003) results also show that concern about the detrimental effects of climate change is high for other countries.

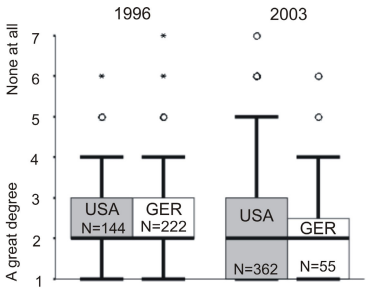

Fig.2.b.To what degree do you think climate change will have detrimental effects for some societies?

_: USA 1996 = 2.51, 2003 = 2.30;

GER 1996 = 2.31, 2003 = 2.22

Sig. Δ _: nil

Sig. Δ _: GER 96-02; USA - GER 96, USA - GER 03

[3] The idea of a heat trapping or suffocating "blanket" smothering the earth is perhaps the latest effort to develop metaphors with popular cachet.

[4] This last respondent was the same one who previously questioned the German right to lead as reflecting a sense of arrogance.

[5] The vociferous responses obtained in this study suggest conscious denial or reactance rather than any sense of amnesia.